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INDUSTRIAL DEVELOPMENT OF SOUTH INDIA.*

I—Agriculture.

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OF all industries agriculture is the most ancient and the most fundamental. We can live without Universities and without lectures; in such a climate as that of South India it is possible to live without houses and without clothes; but it is impossible to live without food. Mr. K. Sundara Rajulu, one of the contributors to the volume published by the University of Madras called "Some South Indian villages", remarks of the Nayudus that "they think, and pride themselves on the thought, that agriculture is the noblest, the least harmful, and the most independent of all professions." They have good reason, Manufacturing industry is dependent on agriculture, for its function is, very largely, to work up raw materials which are themselves the product of agriculture. For these reasons it is right that the first of this short course of lectures on "Industrial Development of South India" should be devoted to the pressing problems of South Indian Agriculture.

It may, I think, be fairly claimed that of all great industries agriculture is the one that yields that greatest enjoyment in their work to the workers engaged in it. Tastes differ, and I can only speak positively for myself; but while I never, when on a holiday, desired to find my recreation by working in a coal mine or in a cotton mill, I find a fascination in agricultural work. When early this year I secured a passage home, and landed at Plymouth, and spent some time there with my mother and sisters, I took the first opportunity of digging in their allotments, and looking at the crop on a little plot I had brought into cultivation for them two years before. When I went to my own house I dug my own allotment, and rejoiced in the opportunity of getting the physical exercise which is desirable for health in that way, instead of being driven to resort, as in Madras, to the childish pursuit of knocking tennis balls over a net; and later I enjoyed the pleasure of going to Woolwich and seeing how fruit trees which I had planted years before were thriving and finding out from the present occupier what crops he had obtained from them. The pleasure of working on the land, particularly if it is your own bit of land, is twofold. There is the pleasure of the sun and air and exercise and seeing the things grow and gathering in the fruits of the soil; and there is the pleasure, by deep digging and manuring and planting trees and by other means, of increasing the fertility and beauty of the plot upon which you work. Therefore it is not

* A lecture delivered at Madras.

altogether a misfortune for a country to have an exceptionally large part of its population engaged in agriculture. In the Madras Presidency there are about five adult male workers engaged in agriculture for every two otherwise engaged. I admit it is too large a proportion, and that the economic prosperity of the country depends, in a great measure, upon the development of non-agricultural industries, and other forms of employment. There should be a reasonable proportion between agriculture and manufacture. But if a community has a choice between an excess of agriculture, as in India, and an excess of manufacturing and miscellaneous employment, as in Great Britain, I think on the score of the general happiness of the mass of the people it should choose the former.

But the aspect of the matter to which I specially want to draw your attention is the fact that the very distribution of population between agriculture and other industries shows remarkable agricultural inefficiency. Five agricultural families in our presidency supply food and other agricultural produce for themselves, and for two Indian non-agricultural families, and a certain quantity of agricultural produce for export. Altogether we may say that they produce enough for eight families, or for nine at the utmost. In western Europe, North America, Australia and New Zealand, I suppose five agricultural families produce, on the average, the necessary agricultural produce for fifty families in all. Hence we cannot say that India compares favourably in agricultural efficiency with those countries. Nor does it compare favourably with China or Japan. Yet India is a country of very ancient civilization—how ancient, no one knows. Civilization may be said to begin with the era when man ceased to live by gathering wild fruits and killing wild animals, and began to subsist by growing grain and harvesting cereal crops. No one knows what land was first tilled, what grain was first sown and harvested, what

beast was first made to serve the cultivator; but my own opinion is that it was Indian soil that was first tilled, even before that of Egypt or Mesopotamia, that rice was the first grain planted, even before wheat, that the buffalo and not the ox was the first animal yoked to the plough, and that some ancient form of Dravidian language was the medium these first cultivators, these pioneers of civilization, used in their conversation one with another. Other people may disagree with this opinion but they cannot prove I am wrong, and they will at least admit that Indian agriculture is extremely ancient, if not the most ancient of all.

How then can we account for the fact that the art and science of agriculture is now relatively backward in India compared with other countries of less ancient civilization? I think it is very largely because of this very antiquity of the science and art of agriculture in India. Much was learnt many generations ago, and the knowledge won embodied in proverbs and customs and traditions passed down from father to son, and the fulness of such knowledge made the pursuit of more knowledge by organized research and experiment appear both very difficult and very unnecessary. One can quite imagine that to many villagers it must have seemed presumption, if not impiety, for a young ryot to want to know more than his grandfather did. So now we have to preach the importance of research; to tell people that of all the factors of production knowledge is one of the most important; to point out the need of a great collective organization for the purpose of carrying out research and diffusing a wide spread acquaintance with the results of research.

We have that necessary organization in the Madras Presidency in the form of the Department of Agriculture. What no single agriculturist can do, by research, for himself, the department can do for them all. But in order that its work may be effective it must be understood by the people, and there must

be close co-operation between the Government department, which is an organ of the whole community, and the individual ryots.

Unfortunately even in the educated part of the community there is a remarkable lack of understanding. Some two years ago I was at Kumbakonam, and attended a meeting of the local Home Rule Association at which a lecture was given on Indian Agriculture, followed by discussion. One of the leading men in the city spoke at that discussion of some new appointments in the Department of Agriculture, and denounced the extravagance of paying salaries of Rs. 500 per month and upwards to Deputy Directors. The only improvements which the department had introduced, he said, which had benefited agriculture in the district of Tanjore, were single transplantation of paddy and growing green manure crops, though these, he admitted, were important improvements. I gathered that if this gentleman had his way under Home Rule, if the department were not shut down altogether, at least only men at very moderate salaries would be appointed; salaries such as would make it impossible to recruit a man trained in any country where agricultural science is more advanced than in India.

Is that a wise attitude? Just let us take the test suggested by that speaker. Suppose that the Department of Agriculture had done nothing else but introduce single transplantation of paddy and the growing of green manure crops, and think what the value of those improvements will amount to when, by the gradual diffusion of knowledge, they are fully utilized, compared with the cost of the department. Remember, on the one hand, that there are over 11,000,000 acres under paddy in the Presidency; on the other hand, that with single transplantation there is a great saving of seed *and* a heavier crop; and that even where green manure can be gathered from adjoining woods and forests the manurial value of a suitable crop specially grown is far greater, and vast areas have no

adequate means of getting adequate supplies from woods and forests. I do not know whether any estimate has ever been made of the rupees per acre that these two improvements are worth annually over the eleven million acres under paddy, but at any reasonable estimate you can see that their value is so great that the salary of a Deputy Director at Rs. 500 or Rs. 1,000 per month is a trifle in comparison. In fact the Department of Agriculture is a sort of bank into which the tax-payers of the Presidency can put in annas by way of investment and draw out rupees annually by way of interest. It is the most magnificent investment possible.

Moreover it is not true that the department has only those two achievements to its credit. Still confining ourselves to paddy we have to note that as the results of prolonged single plant selection carried on for years it is now able to offer the Tanjore cultivators improved varieties of the local rice plant, so that they can either have a variety with the same period of growth and a 15 per cent heavier yield, or a variety with the same yield but a shortened period of growth. Leaving rice, there was the introduction of Cambodia cotton, now the best cotton grown on a large scale in India, giving more than double yield of the cottons it has displaced, as well as fibre of a far superior quality. There was, admit, some luck in that, but when a department is making experiments in many directions, it is only natural that it should have unexpected good fortune in some. And luck alone does not suffice, it is necessary that there shall be continually skilful and assiduous work to safeguard the advantages won, to maintain and improve the quality of the foreign introduction, and safeguard it against pests. In the improvement of native cottons again a great triumph has been won at the Koilpati farm, the "Company Karunganis" yielding, by increased yield and improved quality, on an average an extra profit to the ryot of Rs. 20 per acre. These ryots pay about Rs. 1-8-0 per acre

only in kist! There are many other things of which I might speak, the soil analysis of the deltas, the breeding of improved sugar-canes, the operations against palmyra bud disease, and so on, if time permitted. I must be satisfied with recommending you to study the reports of the Director of Agriculture yourselves.

But now I wish to direct your attention to five burning issues of South Indian Agriculture.

There is first the question of *exhaustion of the soil*.

When we take crops out of the ground we take certain elements from the soil itself. If we keep on taking crops without giving sufficient manure to replace what has been taken from the soil we diminish its fertility, and finally the soil is exhausted. In China it is considered gross impiety and neglect of the religious duty due to the earth Goddess not to return to the soil the human excrement which represents the part of the food consumed which came from the soil. I must not speak of Indian sins in this matter without confessing that no country in the world sins so greatly as Great Britain. But here also in Madras every monsoon, when the bar is open, we pour out into the sea a whole riverful of the most beautiful liquid manure. Great Britain has this excuse for its wastefulness, that it imports vast quantities of food from various countries, including much cattle food, which adds to the store of manure, and also gathers great quantities of fish from the sea.

But what are you doing in India? You are exporting the fertility of the soil. Each year the trade statistics show vast quantities of bones exported, and hides and oil-seeds. Export oil, by all means; that is, made by the plant from the air, but beware how you export the poonacs, or oil-cakes, which contain the part of the seed derived from the soil, or the whole oil-seeds containing both the oil and the poonac. In exporting these things you are exporting the fertility of the

soil; and especially in exporting bones, which contain matter as indispensable and more difficult to replace, than that in the poonacs.

The second issue is the *question of pests and diseases*.

In dealing with these we have to look to Government, and Government is handicapped by the individualism which is characteristic of human nature, either in India or elsewhere. In Great Britain we have learnt that it is worth while to give Government departments very drastic powers of interfering with individual liberty in order to cope with matters like hydrophobia and swine fever, and cattle diseases, and to make individuals submit to loss and inconvenience for the common good.

Similarly when a plant pest appears it can be combated only by common action systematically pursued by all cultivators under Government direction. You have doubtless heard that the boll-weevil which has done such harm in Egypt has appeared in the cotton fields round Cambodia; and energetic action is being taken by the Department of Agriculture to get rid of it. The measures prescribed involve a slight immediate loss to the cultivator to which it is necessary that he should submit, in order to save a great common asset. It is most necessary that in such campaigns as these the department should have the support of unofficial members of the Legislature, and of the educated public generally. It is fighting for the general good, and for the welfare of future generations.

Thirdly, there is the *question of adulteration*.

I have been told that whenever the Indian people find that they own a goose which lays golden eggs, they straightway proceed to kill the goose, by their habit of adulteration. There was, some time ago, a man living near Bombay who is said to have made a fortune because he possessed a pit from which he could dig clay of the same colour as Indian wheat, and that he kept a band of women

there continually at work, kneading the clay into little pellets the size of grains of wheat, and sold it to the merchants to mix with the wheat they exported. The results of such adulteration of Indian wheat was that the price fell considerably below other wheats, although Indian wheat is, in itself, of superior quality. There was all the needless expense of adding the earth, of transporting it, and then washing it out again, and all this came, in the end, out of the price received by the Indian merchant and the Indian agriculturist. But while the community as a whole suffers by adulteration, the tragedy is that the individual ryot or merchant who adulterates more than his neighbours makes an individual profit by so doing, and the honest man who hates the practice, and adulterates less, suffers an extra loss, as the reduction of price based on the average amount of adulteration is spread over the whole output. Similarly, when the trade in Indian indigo revived as a consequence of the war, the old practice of adulterating it with mud revived also. What dyer will prefer the Indian product to synthetic indigo in such circumstances? Specially important to our Presidency is the adulteration of hides and skins tanned here. The dishonest tanner can increase the apparent weight of the hide by soaking it during tanning, in Epsom Salts and other similar solutions. The loss falls at first upon the foreign buyer, but he protects himself by refusing to buy from India, or buying only at a specially reduced price. So the whole tanning trade suffers, and is threatened with extinction, unless adequate steps be taken to deal with the evil.

In some cases this can be done by the trade itself, and this has been done in the matter of wheat. But it is a common interest of the whole community that is at stake, and the Government, therefore, as the trustee for the whole community, ought to recognize its duty in the matter. One grieves to say that in some matters attempts to enforce laws

against adulteration would only lead to exaction of additional *mamuls* by the police. But whatever laws against adulteration can be enforced efficiently, ought to be enacted and executed. It is proved to be possible in the case of hides and skins, because it has been done during the war. There could be no better omen for the future of Indian industry than the enactment of such a law for the period of peace and its effective enforcement, to be followed by other applications of the same principle, until Indian products acquire a world-wide reputation for honesty, purity, and excellence.

The fourth problem is that of *excessive subdivision of land and fragmentation of holdings*.

This I must pass over, as it is too large a subject to be treated here.

The fifth problem is that of *breeds of cattle*.

Some time ago I wanted to make an estimate of the amount of milk annually obtained from the millions of cows in Madras Presidency. I made inquiries in various directions, and finally worked out some figures based on the assumption that it took, on an average, no less than *twenty-five Indian cows* to produce the quantity of milk yielded by an average English cow. I showed my figures to Mr. G. A. D. Stuart, then Director of Agriculture. He immediately declared that I put the yield of an Indian cow much too high, and his opinion was confirmed by the Agricultural College, and even more emphatically by Mr. Allan Carruth, whose special duty it is to deal with cattle. You can guess, therefore, what a vast field there is for improvement in the Indian breeds.

But are we going to get improvement? Not on present lines. Here also the saying about killing the goose that lays the golden eggs applies. In Britain, when we discover in some part of the country a breed of cattle with special merits, like Jerseys, or Herefords or Devons or Kerrys or Ayrshires, the

breed, through such recognition, becomes more numerous, and more attention is paid to it, and the quality is still further improved. In India, sometimes at least, the opposite result happens. There was a specially good breed discovered at Punganur. When this was generally recognized, and the cows came into demand, all the best animals were sold away from Punganur, and no care was taken of the breed by purchasers, and now the Punganur breed is extinct. I found in Mysore the wide-spread belief that the reputation of Mysore cattle is leading to the sale to other districts of all the best bulls, instead of to their retention for breeding purposes, and consequently to the deterioration of the breed; and many people think that the same thing is happening in the Ongole district. It is even, I believe, a Tamil proverb, that "the calf of the good cow dies." If that is true it is a disastrous truth.

We can hardly think of any manner in which a zamindar or other large landowner can deserve better of his country than in fostering and improving the best breeds of domestic animals. It is cheering to know that there are men who are now doing this work. I should like to see the value of their services recognized by Government in the annual distribution of honours, so that others may be made aware, not only of the reward, but of the lasting benefit to all future generations of the Indian people achieved by the man who gives us better cattle, or better sheep, or better strains of useful plants.

INDIAN ECONOMIC ASSOCIATION CONFERENCE.

BY A. J. SAUNDERS, M.A., F.R., ECON. S.,
American College, Madura.

THE third Annual Conference of the Indian Economic Association was held in the senate House, Madras, from Dec. 31st 1919 to Jan. 3, 1920. The importance and growth of the Conference is seen by the greater interest and larger attendance of each succeeding year. Calcutta, Bombay and Madras have each entertained the Conference, but by common consent the last meeting of the association at Madras was the very best up-to-date. This was due largely to the splendid work of the local secretary. Professor Gilbert Slater, and his very efficient Reception Committee, who spared neither money nor effort to make the Conference a great success. The Conference also had the support and good wishes of His Excellency, Lord Willingdon, who was to have opened the Conference, but unfortunately had to be away from Madras on the first day; the University of Madras too showed a deep interest in the proceedings, and allowed the Conference the use of the Senate House for all its meetings.

Madras City and Presidency were, of course, largely represented, among those present and taking part may be mentioned: The Hon'bles Messrs. Littlehales, Paddison, and Macphail, Bishop and Mrs. Whitehead, Mr. Gurney, I.C.S., Professor Slater, Dr. John Mathai, Mr. Brock, Editor, *Madras Times*, Mrs. Arulanandam Pillai, T. K. Hanumantha Rao, Rajagopalachariar, V. Venkatasubbaiah, P. A. Subramania Aiyar, Rev. P. Carty, S. J. and Mr. A. J. Saunders of Madura. Among those from other Provinces were Prof. J. C. Coyajee and Prof. Arthur Brown (Calcutta), Prof. Percy Anstey, Dr. Harold Mann, Mr. B. F. Madon (Bombay),

Prof. Burnett—Hurst (Allahabad), Prof. C. J. Hamilton (Patna), Rao Bahadur Sardar M. V. Kibe, M.A., and Prof H. W. Lyons (Indore), Prof. Kale of Poona, and Prof. K. V. Rangaswami Aiyangar of Travancore.

The Programme consisted of set papers and a free discussion. A brief resume of the programme is as follows :—

First day—Morning session.

Subject :—The Organization of the Teaching and Study of Economics in India.

Chairman—the Hon'ble Mr. R. Littlehailes, Director of Public Instruction, Madras.

The papers contributed were :—

The Projecting Lantern in the Teaching of Economics, by Prof. H. W. Lyons.

The Study and Teaching of Economics in India, by Dr. John Mathai.

(1) Economic Libraries, and

(2) Economics in the University of Madras, by Mr. G. Satyanarayana-murthi, M. A. The Teaching and Economics in India, by Prof. Percy Anstey.

In the afternoon the members of the Association made a most interesting visit to the Buckingham and Carnatic Cotton Spinning and Weaving Mills. The Management did all they could to make our visit as informing and interesting as possible. We had explained to us the Company's Provident Fund and Bonus System for the work people by which in one typical case one won after seven years of service got a bonus, or straight out gift from the Company, of Rs. 453, I think it was. In another case a won after ten years of service got a gift of over Rs. 650. We were greatly pleased with the model Village—clean, neat, separate homes for the employees, and as one might readily expect these homes are in great demand. We saw the distribution of rice to work people at four measures the rupee, which would cost in the bazaar $2\frac{1}{2}$ measures for one

rupee. In this way the Company is spending Rs. 6,000 a month for the sale benefit of the workpeople.

The Mill School is a wonderful institution. Children of workpeople are given a good education with industrial training, and many boys who have passed through the School are now skilled workmen drawing over Rs. 100 per month. The Company is truly alive to the need of social and economic betterment of factory work people in India, and is doing a commendable welfare work among their employees in Madras. Tea was served to the visitors in the Mill School, and Prof. Coyajee expressed our appreciation of what we had seen and heard in a neat little speech.

Second day—Morning session.

Subject:—Industrial Betterment and Welfare Work in India.

Chairman—the Hon'ble Rev. E. M. Macphail, Principal, Madras Christian College.

The papers contributed were :—

The Effect of the Rise of Prices on Rural Prosperity, by Dr. Harold Mann and Mr. N. V. Kanitkar.

Organization of Social Service, by Mr. Whitehead.

A Madras Paracheri by Mr. K. C. Ramakrishnan, M.A.

Problem of Paraiyas, in the Tanjore District, by Mr. Arulanandam Pillai.

The Influence of the War on, and Present Economic Conditions of, the Sourashtra Community in Madura, by Mr. A. J. Saunders, M.A.

Housing of the Poor in the City of Madras, by Mr. V. Venkatasubbaiah, B.A.

Industrial Betterment and Welfare Work in India, by Prof. A. R. Burnet-Hurst.

Afternoon session.

Subject:—The Indian Currency Problem.

Chairman Prof. J. C. Coyajee M.A., Calcutta University

There were papers contributed on.

Our Currency Problems, by Mr. B. F. Madon.

Indian Currency, by Mr. J. H. Wadia.

A Plea for the Currencies of the Indian States, by Rao Bahadur Sirdar M. A. Kibe, M.A. of Indore.

The Exchange Problem, by Prof. C. J. Hamilton, M.A.

Third Day—Morning session.

Subject:—Co-operative Purchase and the True Sphere of Co-operative Banks.

Chairman—Prof. Percy Anstey, Principal of the Sydenham College of Commerce, Bombay.

Mr. T. K. Hanumantha Rao made an eloquent speech on Co-operative Purchase in which he outlined the history and wonderful growth of the Triplicane Co-operative Store in Madras. Mr. V. Venkatasubbaiya and Mr. P. A. Subramania Aiyar also participated in the discussion on Co-operative Purchase.

The following papers were contributed on co-operative Banks.

The True Sphere of Central Banks, by Prof. J. C. Coyajee.

The True Sphere of Co-operative Central Banks, by Prof. P. C. Basu.

True Sphere of Co-operative Central Banks, by Mr. C. P. Sundara Rao.

A Business Meeting occupied the attention of the association in the afternoon, when it was decided to hold the next Annual Conference during Christmas week 1920, at Allahabad, U. P.

Fourth Day—Morning session.

Subject:—The adoption of the Indian Tax System to the Need for Increasing Expenditure.

Chairman—Prof. C. J. Hamilton, M.A., of Patna University.

The papers contributed were: Problems of Our After-War Finance, by Prof. K. V. Rangaswami Aiyangar.

Post-War Reform in Finance, by Prof. K. Bhattacharya.

British Indian Sea Customs Duties and Indian States, by Rao Bahadur Sardar M. V. Kibe, M.A.

Land Revenue and Provincial Finance by Mr. E. V. Sundara Reddie, M.A., B.L.

Reform in India Taxation, by Prof. T. K. Shahni.

It would be futile on my part to try and summarise such an array of papers on such important schemes as are mentioned above. The papers were of a high order, and the discussions which followed were very helpful. The papers must be read to be appreciated, and just here let me say that the Association decided to print all the papers in one volume.*

In the afternoon a visit was made to the Triplicane Co-operative Store. This new famous society began its work in 1904 with 14 members. To-day it has over 3,500 members and 16 branches throughout the city of Madras. The operations of the society up to the present have been confined to co-operative purchase and sale, but now the society contemplates enlarging its functions to take in co-operative production as well. The latest report states:—

	Rs.	A.	P.
Registered Capital raised to	...	1,00,000	0 0
Paid up Capital	...	54,566	12 .9
Reserve Fund	...	51,555	3 8
Common Good Fund	...	26,484	7 3
Memberships	...	3,559	0 0
Sales for year ending 30-6-1919	...	4,77,196	14 10

The last item on the Conference Programme was Tea at Government House for members only. It was a gracious thing on the part of their Excellencies—Lord and Lady Willingdon—to invite the members of the Economic Association to take tea with them at Government House, and it was

* A brief report of the Conference is published in another part of this Journal (Ed., M. E. J.)

much appreciated by the large number of members who accepted the kind invitation. His Excellency is very interested in and alive to all the economic questions of the day, and desires nothing more than the true economic development of India.

Every one with whom I spoke said that the Madras Conference of the Indian Economic Association was a great success. The hospitality of Madras has set a high standard for all future hosts of the Conference. The papers contributed and discussions made the programme a most interesting and profitable one. While more than one member said that the social intercourse and visits of inspection were by no means the least important items of a rich and varied programme every one felt that the success of the Conference was due largely to the untiring efforts of and splendid support given to the local secretary—Professor Gilbert Slater, who was the moving spirit of the whole Conference, and to him the Conference of 1919 is greatly indebted.

At a meeting of the Bombay Cotton Brokers Association Ltd., speeches were made stating that the Government control of cotton, which was intended for maintaining a satisfactory level of price of cotton cloth for checking the speculation and organize trade in the ideal way has failed to achieve its objects and worked to the disadvantage of the Indian cotton producers as against the manufacturers and urging that the constitution of the Central Association proposed to be formed by the Government should be by direct election and not nominations.

INTERNATIONAL LABOR CONFERENCE.

BY A. T. MARKS.

[This is a special report of the Proceedings of the International Labor Conference for the afternoon session of Nov. 19, 21, 1919, received from Mr. A. T. Marks, our U. S. A. Correspondent.,—*Ed.M. E. J.*]

Conference reconvened at 2-30 Nov. 19, U. S. Secretary of Labor presiding. He called for the report of committee on the employment of children. Sir Malcolm Delevingne, Great Britain, chairman, first moved adoption of report by Conference, then explained the action of committee. He stated that the committee had kept two objects in view, to obtain real advantage over the existing conditions and to frame proposals likely to meet general acceptance. Notwithstanding minor disagreements concerning the application of the convention to certain countries, the committee was able to reach an unanimous agreement upon the main points of the report. It was determined to fix fourteen years as the minimum age for entering industrial employment. Exceptions have been allowed to this, in order to allow the period of transition in certain countries which are backward industrially. Certain members of the committee desired a higher age than fourteen but it was decided that recognition by the majority of countries included in the Labor Conference would not be possible under the present circumstances if a higher age were named, though it is hoped later the Conference will make additional advances in convention. Other committee members wished to have the convention extended to all employments, but this was not considered feasible at present. The two following matters, however, were discussed on which the committee was unable to reach unanimous agreement:—

1. Question of allowing some exceptions during the transition period in countries where the age of

leaving school is not yet fixed at fourteen it being represented that in those countries the adoption of the proposition leaves a gap between age of leaving school and the admittance to employment, without the possibility of making educational arrangements necessary to fill the gap by continuing education. This was recognized as a serious difficulty, and helped to convince the committee that the date suggested for application of convention—Jan. 1, 1922—should stand.

2. Question of modification to be allowed in countries having special climatic or industrial conditions was referred to a sub-committee, which divided the nations concerned into two classes—(a) Japan; (b) other oriental countries, India, China, Persia, and Siam. The Japanese Government delegate presented arguments on behalf of the Japanese Government, which were accepted. The Committee was, however, placed in the difficulty because of lack of information from other oriental governments, notably India. Two propositions were submitted to the committee for consideration—(a) Limit of age to be fixed at 12, with special considerations for certain industries; (b) matter to be postponed without decision to next year, by which time it is hoped the Indian Government will have a convention of its own framed. If a definite age limit were fixed by the Conference, it might not be approved by the Indian Government. The Second proposition was approved by the Government and the Employers' delegates from India.

Margaret Bondfield, Great Britain, offered an amendment in the name of British workers, to the effect that in the application of the convention to India certain modifications would take effect prohibiting the employment of children under twelve in factories working with power employing more than ten persons, mines and quarries, railroads, and docks. She said that sufficient reason has not been presented for omitting India from the provisions of the convention. The Argument that the Indian Government has not had time to consider matter is a fallacy inasmuch as child labor is a question that has been discussed by the whole world. The principal objection concerns the actual application of convention, however. The amendment has been drafted to exclude all native or small industries and to include those conducted under western methods, where western factory legislation should apply, providing western safeguards. It has been given as a sufficient reason against the provisions of amendment that parents would object; however, the same argument was given in England concerning the introduction of half time work for children in textile mills.

The question of the inability of the Indian educational system to cope with the problem is very serious and grave responsibility for the Indian Government, but such a problem may prove the quick way to speed educational advancement. Quite probable that the Indian Government will turn down both the original, the convention and the amendment, but the mere attempt on the part of the Conference to introduce progressive ideas in India may give the Indian Government some idea of world opinion on the matter.

Atul Chandra Chatterjee, Indian Government delegate, spoke against the amendment to convention. He said that, though the recommendations of the Conference would give an impetus to social advance in India, progress would have to be slow, because, unlike England, Indian parents have in a majority of cases no education. Several provinces of India have passed legislation providing compulsory education and it is hoped that educational advancement will be made, though time will be necessary to secure funds, teachers, and school buildings. Indian delegates have come

to the Conference unprepared along many lines because much material sent out by the organizing committee of the Conference failed to reach India before the delegation sailed. Mr. Chatterjee concluded by advocating the proposal included in the report of Sir Malcolm Delevingne to postpone action regarding India until the 1920 session of Conference.

Warrington Smyth, South Africa, reiterated the importance of considering the relation of caste system to Indian problems, and of remembering the vast population of the country—300,000,000. He cited examples of Indian industrial conditions, notably in Bengal, where coal mines are worked by cheap labor, whole families going into mines and laboring at night, when it is cooler. Mr. Smyth said that it would be impossible to apply the convention concerning mines to a situation such as this; and advocated the adoption of the suggestion that the matter be postponed for one year.

Narayan Mallar Joshi, Indian workers' delegate, supported the amendment proposed by Miss Bondfield. He said that Mr. Smyth half painted a picture of India as uncivilized or half civilized, and reminded the Conference that India had been under control of British Parliament for more than 100 years; hence to accuse the country of lack of progress during that period would be the reflection upon Parliament. Legislation in India is improving year to year, moreover. Mr. Joshi discussed the application of half time to Indian Industries and stated that the proposed amendment would apply only to certain specialized industries. Mr. Joshi refuted the arguments that children will go on the streets if not employed, by saying that the educational conditions were not as bad as had been pictured by Mr. Symth. He continued that in portions of India where compulsory education had been introduced people had not rebelled against Government, notwithstanding Mr. Chatterjee's argument that it would be difficult to convince parents of the value of the measure. He concluded with the statement that the Indian Government had, despite its plea to the contrary, known that the question of employment of children would be discussed this year, but that Government was endeavoring to secure postponement of action, though influence of Great Britain in favour of the convention would no doubt have effect upon the determination of Indian policy.

WORK AT PUSA, 1918-19.

BY "RUSTICUS."

AS the years go on, the value of the work which is being done at Pusa becomes more and more apparent. On the other hand, the Annual Report of the Research Institute becomes more and more technical. This is only natural as it simply means that the standard of scientific attainment is ever becoming higher as the experience of the staff of the Institute grows and that it is increasingly difficult for them to express their results in language which can be understood by the layman. It is impossible in a *Journal* such as this, which does not cater specially for scientific readers, to give even the baldest summary of the investigations carried on by Dr. Harrison, the Agricultural Chemist, and except in one respect, the same is the case with Mr. Hutchinson, the Agricultural Bacteriologist. Mr. Hutchinson, however, in conjunction with Captain Hodgkinson, R.E., accomplished one piece of work of a non-agricultural nature during the year which should prove of lasting service to India. A severe outbreak of cholera in the neighbourhood of Pusa and the difficulty of obtaining antiseptics turned Mr. Hutchinson's attention to the subject of sterilization of water. He and Captain Hodgkinson have now discovered the possibility of producing a solution containing from three to four per cent of available chlorine from purely Indian materials by electrolysis, thus avoiding the use of imported bleaching powder which involves a great loss of chlorine in transit and in store. The great advantage of this discovery lies in the simplicity of the method by which the solution, which is now known as E.C., can be prepared. It can not only be made anywhere where electric current is available but can also be made of standard strength merely by reading figures on an

ordinary current meter without expert knowledge either of chemical or electrical methods. We believe, though the fact is not stated in the Report, that the cost of the solution is very small indeed. The difficulty which has now to be overcome is that of obtaining a sufficient degree of stability to allow of storage for such periods of time as may be necessary for the transports to situations where electric current is not available. If this problem can be solved, the reduction in the mortality from cholera which should result will be enormous and bad epidemics should rapidly become things of the past.

The section of the Report contributed by Mr. and Mrs. Howard, the Imperial Economic Botanists, is as usual, the most readable and it is doubtless partly for this reason that their work invariably attracts the greatest attention in reviews of the Annual Report of Pusa. We do not propose to aspire to greater merit than other reviewers by departing from the usual practice but, whilst we have no desire to minimize the excellence of the work which Mr. and Mrs. Howard have accomplished, we feel certain that they themselves would be the first to acknowledge that other work which is being done at Pusa may prove as important in the history of Indian agriculture as theirs. Dr. Harrison's investigations into the action of superphosphates in calcareous and non-calcareous soils and into the action of green manures on paddy or Mr. Hutchinson's investigations into nitrogen fixation may yield results as far-reaching as Mr. and Mrs. Howard's work on wheat, though they are hardly likely to be as spectacular for the Pusa wheats Nos. 4 and 12 continue to spread throughout the countryside. The area under them in 1918-19 was estimated at half a million acres and the additional profit to cultivator which accrued from them at 75 lakhs of rupees. Their success is not confined to this country. In New South Wales, in West Australia, and in Uganda, they are coming into general cultivation.

They are being extensively tried in South Africa and Nigeria and samples have been asked for by countries as far apart as Canada and Java.

That the cultivator all over India wastes an appalling amount of water is a well known fact which is the despair of irrigation engineers but it has been left to Mr. and Mrs. Howard to frame the best estimate yet made of the extent to which he misuses his supplies. They have demonstrated that excellent crops of wheat can be grown in North-West India on one preliminary irrigation only whereas the cultivator in Sind applies four or more waterings to the standing crop and his brother in Baluchistan six or seven. Mr. and Mrs. Howard point out that the water which could be set free by more economical methods could be used most advantageously for the production of leguminous fodder crops such as lucerne or berseem (Egyptian clover) and that the general improvement in the organization of the local fodder supplies which would follow the increase in the fodder crops would go far to solve the cattle and milk problems and would also increase the supply of manure. It is satisfactory to find that Mr. and Mrs. Howard's work on soil aeration has convinced them that any fears of soil depletion in the plains of India are groundless. They hold that increased rather than decreased yields are to be expected as surface drainage is improved, as erosion becomes checked, as the texture of the land is improved by the extend use of suitable leguminous rotations and as the conditions necessary for nitrogen fixation are elucidated and applied.

Second only in general interest to the report of Mr. and Mrs. Howard is that of the Imperial Agriculturist, Mr. Wynne Sayer. Mr. Sayer's trials with the Fordson motor tractor have attracted much attention which makes it all the more regrettable that Pusa is too inaccessible to admit of more ocular demonstration of its advantages. Mr. Sayer reports that the tractor worked with

implements in use on the farm and did all that it was asked to do in excellent style. It was hitched successively to a double furrow disc plough, a Ransome's cultivator, Cambridge roll and rake of three spring tooth harrows, and was afterwards used to run the silage cutter. Its work over ploughed land was good and thorough and showed no sign of poaching the land or failing to get a driving grip. Mr. Sayer cautiously declines to express a definite opinion as to the capabilities of the tractor but considers that the experiments so far made with it show that it is an extraordinarily handy machine and its light weight and great power render it well adapted to Bihar conditions and, combined with its low capital cost make the outlook for it in India most promising. But if the Fordson tractors are to fulfil their proper functions in this country, it is essential that a supply of properly trained mechanics should be forthcoming to look after them and that the practice, on which Mr. Sayer caustically comments, of making all adjustments with a hammer and all running repairs with a piece of string should be abandoned. In this connection, it is worthy of mention that, at the recent meeting of the Board of Agriculture at Pusa, a resolution that an Agricultural Engineering section should be added to the Research Institute was adopted. There can be no question of the wisdom of this recommendation. Such a section will be able to keep the manufacturers of tractors and other Agricultural machinery in close touch with Indian requirements and should also be able to prevent this country being flooded with unsuitable machinery or implements. Mr. Sayer's section continues to do most valuable work in regard to the improvement of Indian cattle. The Pusa dairy herd, which is the progeny of Ayrshire and Montgomery stock, is now the most famous herd of its kind in India and the estimation in which it is held is shown by the fact that Rs. 11,850 were realized for seventy animals. This is, however, as Mr. Sayer points out, not a correct index to the value of the herd as the best cattle are naturally kept to breed from.

The work of the Mycological section does not call for special mention as it consisted mainly of a continuation of the researches of previous years. We cannot refrain from a mild protest against the way in which the report of the Entomological section has been

compiled. The tendency to refer to other publications, from which it may be noted, in passing, that other parts of the Report are not entirely free, is very marked in Mr. Fletcher's contribution. We are told that a complete report on the information which has been collected regarding the occurrence within the Indian Empire of any insects which may be utilized as efficient checks on the growth of lantana has been submitted for publication as a memoir. This is a subject of very general interest and some indication of the conclusions which have been arrived at should have been given in the Report. We are also told that the experiments in regard to grain storage were concluded during the year and that the results were written up in a paper read at the third Entomological Meeting which had also the benefit of a paper embodying the results so far obtained regarding the protection of wood against termites. Again, Mr. Fletcher's investigations into the question of determining the immunity of the varieties of cotton against bollworm attack have shewn that certain varieties appear to enjoy partial immunity but it is not stated what those varieties are. We hold that the usefulness of the Report is greatly impaired by omissions such as these and that it should be a complete record of the work done at Pusa during the year to which it relates.

It is satisfactory to note that the number of visitors to Pusa greatly increased during the year. About 165 ladies and gentlemen visited the Institute, of whom the most distinguished was Lord Chelmsford, the first Viceroy to visit Pusa since the foundation stone was laid by Lord Curzon. The number of visitors to Pusa would undoubtedly be very much greater than it is, if it were not for that inaccessibility to which reference has already been made. If those interested in Indian agriculture can make up their minds to face the difficulties of the journey, they are, as the present writer can testify from personal experience, sure of a hearty welcome and will find much that will interest them greatly. Pusa has accomplished so much under the inspiring guidance of Mr. Mackenna that we would, in conclusion, express the hope that, in spite of the hints of his impending retirement which he gave recently at the meeting of Agriculture, he will continue to direct its destinies for a long time to come.

SALEM IRON ORES¹

BY MURRAY STUART, D.SC., F.G.S.,

Assistant Superintendent, Geological Survey of India.

IN April, 1919, I was deputed by the Director of the Geological Survey of India to collect a bulk sample of the Kanjamalai iron ore, in order that it might be considered from the standpoint of electric smelting and magnetic concentration. I accordingly collected three different samples from three different parts of the outcrop, each being a cut across the band; two of these samples weighed a little over 3 tons each and the third a little over 5 tons. Before considering these samples I will shortly review the exploratory work that had already been done on the Kanjamalai iron ores.

In 1864, Messrs. King and Bruce Foote published a memoir on "The geological structure of parts of the districts of Salem, Trichinopoly, Tanjore and South Arcot in Madras" and appended to it a short note on the Kanjamalai magnetite iron ores (*Memo. Geological Survey of India, Volume IV, Part 2, 1864*). In this appendix they give a description of the magnetite ore beds, and on page 161 they state—

"In richness the beds are not constant throughout but vary gradually from a rock, which to the eye would appear to consist of ore to the extent of seven parts in eight (the eighth part being quartz, the only mineral associated with the magnetic iron) to one containing about half its bulk of ore; the great mass of the beds consisting of an intermediate quality,The ore generally occurs in grains of various sizes lying in the planes of foliation, and sometimes uniting into strings or into small laminar patches....."

Report submitted to Government of Madras by the Director of the Geological Survey of India.

".....The yield in the furnace, according to information kindly furnished by Mr. Maylor, the Manager of the Porto Novo Company's establishment at Beypoor, is about 55 per cent of iron pig* requiring 13½ tons of charcoal for every ton of iron obtained....."

And lower down on the same page, and on page 162

"Workings (of two kinds) may be seen in various places surrounding the foot of the mountain.

The kind almost universally adopted consists of small irregular shallow trenches of holes (rarely more than three or four feet deep) generally in the talus of the beds, but sometimes also on the weathered out-crop, from which the smallest and most friable pieces are collected and reduced to coarse sand by pounding (often with only a round stone) if not found in a state of comminution.

The second method of getting the ore is by rude attempts at shafts,.....This second method of working.....is hardly more effective than the first, yielding only a small quantity of the rough ore.....No. 1 bed has of late been worked, chiefly by the first mode for the supply of the Porto Novo Company's works.....

The cost of collecting and picking the ore Mr. Maylor states to be....."

From the above it seems to me that the Porto Novo Company were not smelting the magnetite schist, but magnetite picked out of the weathered and friable portions of the out-crop and talus, after the same had been pounded up to a coarse sand.

Their results in this case would not represent the percentage of iron obtained from the magnetite schist, but from magnetite picked out of the magnetite schist.

The next examination of the ores was made by T. H. Holland the results of which examination were published in Records,

* Or about 62 per cent of metallic iron of the finest quality.

Geological Survey of India, Vol. XXV, part 3, pages 135-159, 1892. In this report the author writes (page 136):—

“Magnetite occurs also, making with quartz, a schist in which the crystals of magnetite are crushed out in the direction of foliation to a roughly almond shape, the proximity of the tapering points giving a lacunar appearance to the rock. Crystals of about one-half to three quarters of an inch in length and of this shape, are common in the iron beds of Kanjamalai.

....All gradations in size are found down to an almost aphanatic rock, in which the constituent minerals are, to the naked eye, indistinguishable as individual crystals.....” and further on page 137:—

“magnetite is the richest ore of iron, containing when pure, 72·4 per cent of pure iron, the remainder being oxygen (Fe_3O_4)... .., in the Salem district it is possible to obtain an almost inexhaustible supply of ore with an average of nearly 60 per cent iron. This result is calculated from the average mineral composition stated by Messrs. King and Foote.....I have collected a large number of typical specimens which I hope to subject to analysis.....”

A further reference to the specimens collected by Sir Thomas Holland is found in the *Technical Reports and Scientific Papers of the Imperial Institute*, 1903, pages 12-22. The results of the analysis are summed up on page 19:—

“In 1892, Mr. T. H. Holland, Assistant Superintendent of the Geological Survey of India, was deputed by the Government of India to secure for the Imperial Institute a representative collection of the iron ores of Madras.....The specimens were accordingly submitted to analysis under the direction of Sir Frederick Abel, and the results published in the *Journal of the Imperial Institute*, Vol. 2, No. 18 (June 1896).....This collection included six samples of ore from Kanjamalai in the Salem district of Madras,

which, on analysis, furnished the following results:—

Available iron.	Insoluble residue (silica).	Sulphur.	Phosphorus.
68·95	1·04	·016	·13
70·06	1·72	·020	...
63·57	8·89	·029	...
66·96	3·17	·010	...
36·44	46·95	·010	...
35·73	48·45	·029	·27

.....”

and in reference to the above it is further stated on page 21:—

“Four out of the six specimens are undoubtedly excellent samples of magnetite...”

The average ore of Kanjamalai, however, is not a pure magnetite but as stated by Messrs. King, Bruce Foote, and Sir Thomas Holland, is a quartz-magnetite schist, and the above four specimens cannot be regarded as representative samples of the magnetite quartz schist, rather as fragments of magnetite from the schist. With the exception possibly of the last two, therefore, the above analysis from a commercial point of view, mean nothing.

The next important investigation was carried out by C. S. Middlemiss who submitted a report in 1898*. Mr. Middlemiss collected material at intervals of about 2 ft. throughout the entire thickness which he estimated to be about 70 ft. thick of the lowest of the iron ore bands. The 32 specimens which he thus collected were carefully broken out from the centre of unweathered lumps of ore. Two tons of the best of this ore were afterwards selected to be sent to England for testing. The results of analysis on the bulk sample so obtained are quoted

* This report was not published.

in the Imperial Institute report already mentioned (pages 19-21) as follows:—

“A specimen of the consignment of ore specially selected this year by Mr. Middlemiss of the Geological Survey of India, for transmission to Messrs. Bolckow, Vaughan & Co. as typical of the Kanjamalai deposit, referred to in his memorandum of the 6th February 1898, furnished on analysis in the laboratories of the Imperial Institute the following results, which are in substantial agreement with those obtained by Messrs. Bolckow, Vaughan & Co.”

The results of these analyses are given as—

	Imperial Institute	Mr. Stead
Iron	38·74	39·02
Insoluble residue (silica.)	44·09	42·36
Lime	·365	1·00
Sulphur	·076	·03
Phosphorus ...	·14	·13

Mr. Stead analysed the sample for Messrs. Bolckow, Vaughan & Co.

The following comments are made on the above (ibid, page 21):—

“We may therefore conclude that if the sample of Kanjamalai ore is, as Mr. Middlemiss asserts, an average specimen of this deposit, this ore cannot be seriously regarded as suitable for smelting.....Similarly if the sample of Sanctoria coal sent.....I am, however, of opinion that neither of these two points has been established. As regards the ore Mr. Middlemiss remarks: only occasionally, in small pockets or as veins, or local accretions (not more than a few inches across), do we sometimes find masses of pure or almost pure magnetite. But it would not be fair to include these in any estimate of the general richness of the beds. It is doubtless due to some such specimens as these having

been gathered that some of the analysis of the Kanjamalai iron ore carried out at the Imperial Institute, gave such abnormally rich percentages of iron (about 70 per cent). Now the specimens of ore referred to by Mr. Middlemiss as having been analysed at the Imperial Institute were selected by Mr. T. H. Holland as typical portions of the deposit.”

I would point out here that specimens representing portions of a deposit do not necessarily represent the deposit as a whole, and that the criticisms passed on Mr. Middlemiss' conclusions were not justified. The specimens of magnetite previously analysed represented the magnetite of the magnetite schist, the quantity of it in the schist being accepted by Sir Thomas Holland to be the amount stated by Messrs. King and Bruce Foote. The sample sent in by Mr. Middlemiss was the first actual sample of the beds as a whole to be analysed, and it proved, as the samples now collected by me confirm that the estimate given in Messrs. King and Bruce Foote's report was too high.

DESCRIPTION OF THE ORE.

As described by Messrs. King, Bruce Foote, and Sir Thomas Holland the ore is a quartz-magnetite schist, ranging in texture from a rock in which the lenticles of magnetite are from one half to three-quarters of an inch long to an almost aphanatic rock in which the constituent minerals are almost indistinguishable to the unaided eye. I carefully looked for the pockets, or veins, or local accretions of pure or almost pure magnetite mentioned by Middlemiss as occasionally occurring in the rock and was surprised to find how seldom they occur and how small they usually are. It was only after a long search that I found any at all, and then they were of insignificant size. That they do occur in the rock is obvious from the fact that the scree and talus from the iron ore band which lies scattered over all the surrounding fields contains occasional fragments

of magnetite. None that I saw were more than a few inches across, and they evidently form a negligible portion of the deposits.

From a heap of screenings at the south-east corner of the hill it seems that, at some time fragments of magnetite have been collected and used for the production of iron. I do not agree with Messrs. King and Foote that some of the band would appear to the eye to consist of ore to the extent of seven parts in eight. My impression was that the rock consisted of rather less than half of its bulk of ore, an estimate that is supported by the analysis of bulk samples. Bulk samples were taken from the lowest and most important band at three different places.

A little over three tons was taken from the bed at the north-east corner of the hill where most work seems to have been done on the deposits.

Another sample of over three tons was taken from a point 100 yards west of the first sample, and one of over five tons from a point at the south-east corner of the hill. In each case the material was obtained by making a cut across the bed and obviously poor ore, containing one-third or less of its bulk of magnetite, was thrown away. I mention this to show that whereas my samples are average samples of the material that would be quarried for commercial purposes, they are slightly richer than a sample representing the quartz-magnetite schist as a whole should be.

Parts¹ of the samples were analysed in the laboratory of the Geological Survey of India, by my colleague Mr. H. Walker, with the following results :—

Number of sample.	Percentage of iron.
1	39'03
2	38'6
3	37'12

It will be seen that the sample taken from the point where Mr. Middlemiss took his agrees entirely with the latter, the sample taken by me giving 39'03 per cent iron

and that taken by him giving 39'02 per cent iron. It may therefore be taken that the point that Prof. Dunstan held had not been established, namely, that Mr. Middlemiss' sample represented the average of the deposit, has been established completely, and that the estimated richness of the beds, given in Messrs. King and Bruce Foote's report was too high.

That report does not definitely state what was being smelted at that Porto Novo Company's establishment, but from Mr. Maylor's quoted statements it would appear to have been picked material—probably magnetite picked from the schist. Four separate bulk samples have now been taken, one by Mr. Middlemiss and three by me, each weighing several tons and the analysis of these all agree.

TREATMENT AND SMELTING OF THE ORE BY ELECTRIC POWER.

As the distance of the ore deposit from the coalfields of India, or from the coast, prohibited the ordinary smelting of the ore, and as the local supply of sufficient charcoal for this purpose had also proved to be impossible, the suggestion has been brought forward that the ores might be treated and smelted electrically, it being possible to obtain electric power from a proposed hydro-electric power scheme on the borders of Madras and Mysore. The treatment of the ores under this scheme would consist of—

- (1) Crushing the ore.
- (2) Magnetic concentration.
- (3) Briquetting the concentrated magnetite with charcoal and limestone.
- (4) Smelting in an electric furnace.

Experiments already carried out on the ore have shown that the preliminary crushing must be exceedingly fine to give a satisfactory result. The first point to be considered is whether sufficient charcoal can be obtained locally. The smallest electric smelting furnace that is estimated would pay, is one turning out 60 tons of iron per day. Now the electric smelting of iron ore requires approximately 17 cwts. of charcoal for every ton of iron produced. Therefore

¹ Probably representative of the whole samples.

the daily production of sixty tons of iron would involve the consumption of fifty-one tons of charcoal, and this would mean the carbonization of at least 204 tons of wood daily. The Salem forests have been investigated,* and in 1875 the Madras Board of Revenue stated that fellings in the Salem district had given twelve tons of wood per acre, and that reproduction wood replace this wood in twelve or fifteen years. They estimated therefore a yield of one ton of wood per acre from forest reserves. Subsequent reports gave the outturn as $4\frac{1}{2}$ tons, which in a twelve years rotation would give an annual yield of one-third of a ton per acre. The provision of 204 tons of wood daily, therefore, would mean the cutting of 612 acres of forest reserve every day. This wood would then have to be cut up, carbonized, and the resulting charcoal conveyed to the smelters daily. A forest area of at least 224,092 acres would be necessary for the continuous supply of charcoal.

Since the charcoal is the scarce material, the crushing, briquetting, and all the other necessary operations would have to be done by electric power. The amount that would be consumed in this way would be considerable. The magnetite schist is exceedingly hard and considerable electric power would be consumed in the satisfactory crushing of it.

The electric smelting of iron ores is only just coming into commercial practice. It is now being done in Sweden. At the joint meeting of the Iron and Steel Institute and the Institute of Electrical Engineers held in London on 8th May 1919, Mr. J. Bibby pointed out that the electric smelting of iron ores became commercially sound only when one horse-power year of electrical energy cost less than 2'3 tons of coke (see the report in *Nature*, May 22nd 1919, page 236).

Owing to the low grade of the Kanjamalai ore—practically three tons of which would have to be quarried, crushed, and treated in a magnetic concentrator for every ton of iron produced,—its extreme hardness, and the large area from which wood for charcoal would have to be collected, I do not consider that the electric smelting of the Kanjamalai iron ores lies within the bounds of present commercial possibility.

* See Smeeth, Notes on the electric smelting of iron and steel, Bulletin No. 5, Mysore Geological Department, 909, page 70.

RECONSTRUCTION IN GREAT BRITAIN.

BY R. K. SANGAMESWARA IYER, M.A., L.T.

"Not infrequently war gives rise, not only to new educational ideals, but to new institutions and to new types of institutions favourable to the advancement of science."—Walter Libby.

An anxious era of reconstruction has succeeded an era of devastating war in almost every part of the world; but reconstruction is pursued with almost a feverish energy in those European countries that were directly engaged in the recent great war. Reconstruction appears to be a natural reaction of war; for if we look back to the past, a national reconstruction of education or science invariably owed its origin to a great war or revolution. War itself acts as a great stimulating influence, "in increasing the demand for useful and practical studies. In the activities of naval and military equipment and organization this influence is obvious enough; it is no less real in the reaction from war which impels all to turn with new zest to the arts and industries of peace and to cherish whatever may tend to culture and civil progress."*

Though the policy of reconstruction is at present largely guided by unbalanced winds, distracted as they are by the recent great struggle, yet there is no doubt that in several directions the foundations for a great and prosperous future are being truly and soundly laid. A poor country like ours on the threshold of development, may be profited a good deal in its task of construction by carefully scrutinising what is being done by way of reconstruction in the leading countries of the world, and assimilating what is good for its own amelioration.

But, at present, information regarding reconstruction from other countries is meagre

* Libby. *History of Science*; London 1918.

and scattered except in the case of England, where the task of reconstruction is considered so vital and important for national greatness in future, that a separate ministry called the "ministry of reconstruction" has come into existence. Reconstruction in that country appears to be many sided. All are familiar with the thorough changes contemplated in education, on the basis of the recommendations of Sir J. J. Thomson's committee and of several 'experts' in the field. Equally characteristic is the attempt that is being made to protect and foster certain industries, known as the "key" industries, that were brought into existence in the country during the war. Thirdly, the very great attention that is being paid to develop agriculture, forestry and fisheries is remarkable in view of the fact that England is pre-eminently a great industrial and manufacturing country rather than agricultural. Lastly, the universal shortage in coal and oil supply during the war years and after has awakened a keen sense of responsibility and brought about anxious investigations regarding the future 'fuel' resources of England and the British empire on a more careful examination, the policy of reconstruction appears to be inspired by one of self-sufficiency within the empire. Be that as it may, every item of reconstruction is full of interest and I will deal with only a few of those that may be found to be valuable to the general public, as well as to the practical politician.

THE PROTECTION OF 'KEY' INDUSTRIES IN BRITAIN.

It has long been feared, not without reason, that one of the immediate consequences of peace would be to subject England to a flood of manufactured articles from Germany; for it was an open secret that German manufacturers were preparing, by every means in their power, to recover and retain their former hold on the English and other foreign markets. They were steadily accumulating stocks to be "dumped" into Great Britain. If they succeeded in this, the several indus-

tries, that came into existence in England during the war years, and with which the national welfare was closely bound up, would come to a precipitate end. The country was quick to recognise the importance of developing such industries and the Government was equally ready to respond to public pressure by the steps it took to foster their initiation and future development. These "key" industries, were mainly those which depended upon the applications of physical science, such as the manufacture of synthetic dye-stuffs and drugs, analytical reagents and other important chemical products, optical glass and instruments, electrical apparatus, magnetoës, and a considerable number of inorganic products and medicaments. As an Englishman puts it, before the war "we had become wholly dependent upon Germany for a large number of articles comprised under these categories, which are absolutely essential to the prosecution of war under modern conditions.....Now we have not only triumphed over difficulties well-nigh insuperable, but, as is well-known, we have also in many cases bettered the example of our enemies, and certain of our manufactured articles have reached a pitch of excellence which Germany never attained."

In order that this pre-eminence—the fruit of so much anxiety and toil—might be utilised to the fullest extent, the Board of Trade has already prohibited the importation into the United Kingdom of the above mentioned articles. In addition to this they are taking steps to protect other newer industries such as scientific glassware, laboratory porcelain, etc.

For the advancement of industries in future the "Department of Scientific and Industrial Research" has revised various schemes for the carrying out of which funds are placed at its disposal. With the help of groups of manufacturers nine research associations are already in operation, "eight more have been approved and are only

waiting the license of the Board of Trade, while twelve others are under discussion."

Propaganda work is carried on by the Ministry of Reconstruction by the publication of a number of pamphlets, which are readable by the public, whether directly concerned with industry or not. Again, institutions like the Royal Society and the British Science Guild not only arrange for popular lectures, but also organize in various ways the exhibition of scientific products, so as to bring home to the people's mind the importance of maintaining and fostering the newer industries. One must not fail to mention in this connection the rapid coming into existence of large numbers of research councils and societies of all magnitudes from the International Research Council down to the Glass Research Association.

How far the people of the country have successfully co-operated with the Government in the work of patronising home products and boycotting the German ones, may be appreciated if we remember that within the period of eight months since the signing of the armistice, the German articles imported into England were only valued at £40,000 while at the same time the British exports to that country stood at £16,000,000.

DEVELOPMENT OF AGRICULTURE FORESTRY, ETC.

If we now turn to another phase of reconstruction in England we cannot but be surprised at the very great attention that is being paid for the production of Agriculture and forestry in a leading industrial country. Here is certainly a lesson to be learnt by purely agricultural countries like British India and the Native States, where more than 70 per cent of the population are mainly dependent on agriculture, and where about 30 per cent of the national revenue is from lands.

It appears that agricultural research and education were in a totally neglected condition in that country till the year 1910,

when Mr. Lloyd George came to the rescue and appointed the Development Commission.* This commission, organized as it was by Mr. Lloyd George, differed from others of its kind in that it had not only a full share of the usual deliberative functions, but it was also provided with the necessary funds for the promotion of research, and of various schemes calculated to assist the Agricultural industry. From the year 1911 up to 1919 the Development Commission was spending a sum of £50,000 annually, by distributing it to various agricultural institutes and colleges so that they may improve their laboratories and staffs. There is little doubt that this grant saved these institutions from losing their best men, most of whom till then, finding little prospects in their own country were obliged to seek posts elsewhere in the colonies, dependencies or the United States. That the country has already derived considerable benefit from this movement is evidenced by the fact that the present proposals involve an expenditure not of £50,000, but of £400,000 a year on agricultural development.

Since 1911 there has been in existence a scholarship scheme which it is now proposed to extend and strengthen. At present there are some forty permanent posts for research work at the agricultural institutions, offered to men who have distinguished themselves in natural science at the universities; and this number will be gradually raised to 150 in the near future.

In addition to these attempts at fostering the intensive cultivation of agricultural science and industry there is also a scheme for the general development of agricultural education throughout the country. At present there are a dozen agricultural colleges in England and Wales alone, but the link between the Agricultural college and school is not very definite. The work of the

* See for instance an article by E. T. Russell in *Nature*, Vol. 103, 227.

colleges is now mainly related to the needs of the coming generation of farmers. It is proposed, however, to bring them into closer touch with men at present farming by the establishment of demonstration farms and other organizations. For example it is proposed to erect more 'farm institutes,' where intelligent boys can go for winter courses and girls can be taught in summer; a certain amount of this kind of work has been done and its value demonstrated. Finally there is provision for giving short courses to school teachers, who will be engaged in the new continuation schools in rural districts.

While such is the scheme for the development of agricultural industry, research and education, that for the improvement of forestry is no less remarkable.

The Forestry Bill that was before the houses of parliament was a Government measure based upon the reports of a Forestry Sub-Committee appointed by the Minister of Re-construction. The Bill creates a Forestry authority consisting of a few commissioners "charged with the general duty of promoting the interests of forestry, the development of afforestation, and the production and supply of timber in the United Kingdom." The commissioners will have powers to expend £3,500,000 during the next ten years in afforestation. They have very wide powers; this large sum of money is at their absolute disposal and will be subject to no control by Parliament or Minister. Further they "may acquire land, compulsorily if necessary, and may plant trees themselves, or aid, by loan or grant, owners of land to plant." It is expected that within the next ten years, nearly a quarter of a million acres will be planted, while the afforestation of 1,750,000 acres is contemplated in 80 years. Also an amount of £6,000 is to be set apart annually for research in forestry.

Attempts in various directions are being made to improve the condition and supply of several important articles of daily consumption, within the United Kingdom and the British Empire. The institution of Department of Fisheries, the investigations as to "the

possibility of growing New Zealand flax on a commercial scale in the British Isles," the appointment of Sugar Commission to investigate the possibilities of increasing the sugar production of the Empire, are instances in point.

THE FUTURE 'FUEL' SUPPLY OF ENGLAND AND THE EMPIRE.

During peace as well as war, every modern country consumes large quantities of petrol. The demand for that commodity is increasing day by day to meet the growing needs of motor transport by road, sea and air. The annual importation of petrol into England rose to more than 100,000,000 gallons before the war. At present about 150,000,000 gallons of petrol are imported yearly; most of this comes from the United States, which country, again, consumes not less than thirty times this quantity. In view of the world shortage of petroleum and the enormous increase in consumption of petrol in the United States, it is naturally feared that in a few years England would have to face a shortage in petrol, if not actually a petrol famine. In view of these considerations an Inter-Departmental Committee was appointed to consider the feasibility of a substitute for petrol. The labours of the committee have already been crowned with success. They have found that alcohol from potatoes or the sundried flowers of the Indian *Mahua* tree, might be successful as a substitute. It has been worked out, that while potatoes yield 20 gallons of alcohol per ton, the *mahua* flowers yield as much as 90 gallons per ton. Here, as in so many other cases, "the raw material comes most abundantly and most economically from the tropics." These investigations thus indirectly bring about the possibility of developing a new industry in India.

The coal problem of the future is equally serious. In the words of Sir A. Parsons,* "England owes her modern greatness to the early development of her coal. Upon it one must continue to depend almost exclusively for heat and source of power, including that required for propelling her vast mercantile marine. Nevertheless she is using up her resources much more rapidly than most other countries are consuming theirs" and before long there may be an exhaustion of, at any rate, the richer seams. So that failing new and unexpected discoveries in

* Inaugural address before the Bournemouth meeting of the British Association, Sep. 1919.

science, "the great position of England cannot be maintained for an indefinite period." To ease the situation a little, it is proposed to harness the water power to a greater extent in England and in the Empire.

According to the latest estimates, the total amount of available water-power in the British Isles is only 1,500,000 h. p. of which more than 2,000,000 h. p. have already been harnessed. In the rest of the British Empire there are upwards of 30,000,000 h. p. and in the remainder of the world at least 150,000,000 h.p., so that England herself possesses less than one per cent of the water power of the world—a statement not very encouraging.

As to the possible new sources of power, Parsons himself suggests an ingenious alternative which appears to merit attention. He proposes to utilise the great internal heat energy of the earth by sinking shafts to great depths. This does not appear to be a mere speculation if it is remembered that "in Italy, at Lardarello, bore-holes have been sunk which discharge large volumes of high pressure steam, which is being utilised to generate 10,000 h.p. by turbines."

Less ingenious methods for conserving the existing coal supply are adopted on the recommendations of committees* and experts; among which may be mentioned the invention of improved furnaces, reports, etc., in steel manufacture by which the quantity of coal consumed is considerably diminished, and the attempt at "the production of a smokeless fuel, with the object of abolishing the smoke nuisance and also of saving the valuable volatile products which are wasted in burning coal."

I have just attempted to give some idea of some of the aspects of reconstruction in a great country. It would now be clear that the problem of Reconstruction in England is many sided; indeed its variety is only equalled by its complexity and stupendousness. The ordinary mind might even be reminded of the old adage of "too many irons in the fire," but in this instance, I am sure, as I wish it to be, that everyone of the iron pieces in the fire is fairly well cared for.

* The number of Committees, Commissions, Councils and associations that have come into existence in England, in connection with Reconstruction, is really bewildering. Apart from the organizations mentioned here, I have been able to count not less than twenty more.

EXPERIMENTAL CONVERSION OF CRUDE-LAC INTO SHELLAC ETC.

BY L. S. SUBRAMHANYA IYER, B.A.,
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THE uses of shellac are various, as already enumerated in my Note on the "Mode of Preparing Seed Lac from Crude-lac" published in the *Mysore Economic Journal* for November, 1919. For most of the uses to which lac is put locally, it is used in the form of *Avalakki Aragu*, an impure kind of lac in the shape of small irregular buttons, in which form it is sold in bazaars. This lac is unsuited for *Lacquer Industry, Sealing Wax*, etc., as it contains impurities, such as remains of insects, bark and wood. For such industries pure and refined shellac is required. In Channapatna alone about 2,000 lbs. of refined shellac imported from Mirzapur is consumed annually by Lacquer Industry, but whether it is used in any other parts of the State for industrial purposes is not ascertainable. There are indications of the local demand for refined shellac increasing rapidly while demand for it from Western Countries is also going up. It is unlikely, therefore, that its future prices will fall so low or fluctuate so greatly as in the pre-war days. Hence there seems to be great scope for not only improving and further developing the production of Lac but also for starting a *Shellac Factory* for conversion of the raw-lac now produced in the State.

With a view to study practically the methods of manufacture and to collect data regarding percentages of yield of lac-dye, pure lac-resin and shellac, and their qualities, experiments were conducted on a small scale in the Special Forest Office. The results of these experiments are given below.

Four kinds of crude lac, viz., *Sagade* (Kusam), *Muttuga* (Palas), *Chotte* (Ghont) and *Jalari* were experimented upon. Of these, the Kusam lac was grown in Lakka-valli, being the result of the 4th generation of brood-lac originally imported from the Central Provinces, and Jalari lac was grown near Bannerughatta and Puttenahalli in the Bangalore District. The other two kinds were obtained from the Central Provinces as brood-lac for propagation in the State, but owing to delays in transit, the lac-insects were dead.

Method of treatment was briefly as follows:—The samples of raw lac received were first weighed and then cleaned of all extraneous matters such as bits of bark and wood by hand-picking, sifting and winnowing. The weight of such foreign matter was ascertained. The cleaned crude-lac was pounded, passed through sieves of different fineness and sorted into different grades. These latter were then washed repeatedly with fresh water until all the dye was extracted. The last wash was with a dilute solution of sodium carbonate 2 per cent to remove any traces of dye adhering to the lac.

LAC-DYE.

The wash liquor of all the washings was filtered through cloth into a pot, and the water evaporated out until the dye was left at the bottom. To keep the cost of evaporating the water as low as possible, the

minimum quantity of water compatible with as complete removal of the dye as practicable was used in washing. The suspended impurities in the wash-liquor remaining on the filter cloth were removed, washed, dried and weighed.

Any fine particles of lac-resin and extraneous matter escaping through the cloth filter with the dye-liquor, constitute the only impurity in the dye. Such impurities are much less when cloth-filters are used instead of wire gauze sieves, but this being a much slower process than sifting or straining in a sieve, the latter is adopted in dealing with large quantities, especially so when there is little or no demand for *lac-dye*. Samples of the dye obtained from the four kinds of crude-lac were all dark in colour with a tinge of coppery hue.

The *lac-resin* after being thus thoroughly washed and dried in shade formed the "*Seed Lac*." In this stage it still contained a small percentage of impurities removable only by dissolving it in hot alcohol and filtering.

The percentages of such residual impurities calculated on the weight of the original crude-lac are shown along with those of lac-dye, seed-lac, etc., in the subjoined table. The figures given represent the averages of more than one experiment with each kind of lac, except that of *Muttuga* with which only one experiment could be made from the available crude-lac.

No.	Particulars.	Jalari	Sagade	Muttuga	Chotte	Remarks
		Shorea Talura	Kusum	Palas	Ghont	
1	Bark, wood, and other vegetable matter in crude-lac separated by hand-picking and winnowing. ...	Per cent 5.5	Per cent 10.5	Per cent 15.5	Per cent 10.0	
2	Foreign matter such as the remains of dead lac and predacious insects, vegetable dust, etc., separated by washing	10.6	9.6	10.0	8.0	
3	Earthy matter settling down in washing ... ..	.9	1.0	1.5	2.0	
4	Lac-dye obtained	7.1	3.5*	6.0	7.0	
5	Foreign matter separated from seed lacs by winnowing and extraction of resin by hot alcohol	5.5	5.0	5.0	5.0	
6	Quantity of pure resin	64.5	66.4	62.0	62.4	
7	Wastages during the course of the several operations	5.2	4.0	4.0	5.0	

PREPARATION OF SHELLAC.

The *Seed-lac* obtained as described above was dissolved in hot alcohol (60° O.P.) and filtered. Experience has shown that seed-lac stored for some time (three to four months) requires four to five times its own weight of alcohol to dissolve it, but when previously soaked over night in water, about three times its weight of alcohol will suffice. The solution obtained was evaporated over a slow fire until the lac-resin remained in the receptacle in a molten state. The molten lac was then dashed on to a tinsplate and drawn into a sheet, but when the sheet cooled, it stuck to the tin surface. A porcelain cylinder containing hot water would suit better. In the absence of suitable appliances of a lac-refinery for drawing out the shellac into thin sheets, the molten lac had first to be made into thick sheets and then drawn over a fire into thin flakes. This was a tedious and slow process quite unsuited for adoption in a commercial factory.

The samples of shellac resulting from the experiments were displayed in the last Dasara Exhibition at Mysore.

A sample was also sent to the Secretary of the "Co-operative Lacquer Works" Chennapatna, for testing and valuation. He valued it at Rs. 100 a maund of 80 lbs. while the Mirzapur shellac was sold at about Rs. 200 a maund. This low valuation was due to our shellac being darker in colour than Mirzapur lac and consequently less suited

*N. B.—The crude Sagade-lac which yielded only 3.5 per cent of dye had been used as brood-lac and afterwards stored for over eight months in the office, hence the low yield of dye. Another sample of Sagade lac which had been tied on to trees from end of June to middle of August 1919, thus being exposed to heavy rain and sun for seven weeks yielded no dye and contained only 11 per cent of impurities removable by mechanical processes and 4 per cent by alcoholic extraction of the resin. The *pure resin* content of the sample was therefore 85 per cent. This confirms Mr. Fraymouth's experience that stick-lac when used as brood lac on trees gets cleaned and bleached by exposure to sun and rain on the trees, and that therefore it is advisable to use a whole fresh crop as brood before being brought down the trees, unless the lac-dye is a paying by-product.

for finer shades of colour. The darker colour of our shellac was due to (a) to the melting of the *lac-resin* over direct fire instead of heating it by steam, (b) to the employment of 60° O.P. alcohol instead of absolute alcohol or wood spirits, and (c) to the primitive appliances used in the preparation.* Later experiments resulted in making lighter coloured shellac, but the quantity prepared was not large enough for commercial valuation. Small samples of shellac and lac-dye, have, however, been sent to the Deputy Director of Commerce for testing and valuation by local users of both.

EXPERIMENTAL PREPARATION OF SEALING WAXES.

This was undertaken with appliances *locally improvised* and consequently far from efficient, steam-jacketted pans and suitable moulds not being readily procurable locally. After repeated experiments with

* The 60° O.P. alcohol locally obtainable, contains about 9 per cent of water in it, which remains in the lac when alcohol is evaporated away from solution. This water is driven off only by protracted and vigorous heating which has a darkening effect on the colour of shellac. Absolute alcohol which contains little or no water (commercial absolute alcohol contains less than 0.5 per cent water) would suit better than 60° O.P. alcohol. Better than both these is strong wood-spirits (methyl alcohol) which, boiling at a lower temperature than alcohol, is more easily driven off from solution than the latter, with the result that the shellac comes out much finer in colour. So the best solvent to be used in the manufacture of refined shellac is *strong wood spirits*.

Want of facilities for dehydrating the available alcohol necessitated the use of the latter in the experiments.

different ingredients in varying proportions, satisfactory *recipes* have been arrived at for making tolerably good *sealing waxes* which are believed to stand the stationers' tests. Wafers obtained from them compare favorably with those of imported sealing waxes showing the impressions in bright and clear relief. Different coloured sticks were made and exhibited at the last Dasara Exhibition.

The method adopted for making the sticks was briefly this:—

A few moulds made of tin sheet, two or three enamel cans, a stove and a ladle were all the apparatus that could be locally procured and used in making the experiments.

Pine-rosin was first melted in a can and then turpentine (Oleo-resin) gradually added. Lac-resin in the form of picked seed-lac was added, keeping up a gentle heat, the mixture being constantly stirred. The other ingredients finely powdered were mixed together well and gradually added to to the molten liquid and constantly stirred. When the composition was well mixed and of a suitable consistency for being poured out into moulds, oil of turpentine being used for regulating the consistency as required, the mixture was ladled out into the moulds. After the sticks cooled, they were taken out, trimmed and polished by superficial melting over a gentle fire. If trade-mark or makers' name is required to be impressed on the sticks, it could be done at this stage, if it was not engraved in the mould itself.

Some of the *recipes* worked out in the course of the experiments (based on those of "Spon's Workshop Receipts") are given below:—

RECEIPTS.

	Reds		Blues		Yellow		Greens	
	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2	No. 1	No. 2
Shellac or clean seedlac ...	3 parts	$\frac{1}{2}$	3	1	3	$2\frac{1}{2}$	3	1
Turpentine (Oleo-resin) ...	1	$\frac{3}{4}$	$1\frac{1}{2}$	1	$1\frac{1}{2}$	3	$1\frac{1}{2}$	1
Oil of turpentine ...	$\frac{1}{4}$		a little		a little		a little	
Rosin ...	1		1	$\frac{3}{4}$	1	$1\frac{1}{2}$	1	$1\frac{1}{2}$
Colour ...	$2\frac{1}{2}$ (Red Lead)	$\frac{1}{2}$	1 (Victoria blue)	$\frac{1}{2}$	$1\frac{1}{2}$ (Lead chromate)	$\frac{1}{2}$	$1\frac{1}{2}$ (Mixture of blue and yellow)	$\frac{3}{4}$
Plaster of paris ...	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$\frac{3}{4}$	$\frac{1}{2}$

For red coloured sticks which are the most common ones *cinnabar* is used as a colouring agent for finer qualities and *red-lead* for ordinary ones. For yellow-sticks *lead-chromate* is used and for blue *ultra-marine*. *Berlin blue* is used for superior blue-sticks. Green of any required shade is obtained by mixing yellow and blue colours.

The above method is of course primitive and unsuited for making nice sticks on a commercial scale. Further trials on a larger scale with more suitable appliances have to be made to collect data necessary for considering the manufacture of *Sealing Waxes* and *Shellac* on a commercial basis.

[Note by Rao Saheb M. Rama Rao, Special Forest Officer.—The foregoing interesting note clearly indicates the possibility of manufacturing locally *Shellac*, *Sealing Waxes* and *Lac-dye* from the indigenous crude lac grown in the Country. Almost all the raw material produced is exported and the prices realised hitherto have been too low to induce our Lac-farmers to take any active interest in enhancing the outturn and improving its quality. Our average annual exports during 1913-14 to 1917-18 were 828 maunds (local) valued at Rs. 5-12-7 per maund, while our imports were 358 maunds valued at Rs. 6-10-10. During the same period the average values realised for all-India exports of unmanufactured lacs were Rs. 7-4-5, and Rs. 14-9-11 per maund, respectively. Our crude lac fetched Rs. 1-7-10 less than all-India crude lac, while it fetched Rs. 8-13-4 less per maund than manufactured lac. The cost of manufacture on a large scale would certainly leave a much larger margin of profit than what was realised for our raw material. At present the prices of both manufactured and raw lacs are very much higher, the former being Rs. 45-8-0 per local maund at Calcutta (November, 19) while the latter (crude lac) is now selling in our local market at about Rs. 15 per maund. Our importers of *Shellac* and

Button lac for Lacquer industry in Chennapatna had to pay Rs. 59½ and Rs. 68½ per local maund in September, 1919. Such exorbitantly high prices that our artisans have to pay for imported shellac naturally discourages the Lacquer Industry in the State, while the low prices realised for local crude-lac discourages our Lac-Farmers.

The above facts and figures point to the necessity and importance of taking needful measures to start a *Shellac Factory* in the State for utilising the locally-grown lac, thereby giving a great impetus to the development of lac-cultivation on the one hand, and of Lacquer industry on the other. The experimental cultivation of Kusam-lac introduced at end of December, 1917, on Sagade trees has become well established in Lakka-valli forests and holds out promise of success if extended to other forests where this species of tree is found. Further experiments with *Palas lac* on Muttuga and other trees in the Bangalore, Mysore, and Kadur districts are being tried and there is no reason to despair of their success.

In these circumstances, it is proposed to undertake further investigation of *Shellac*, *Sealing Wax* and *Lac-dye* industry on a semi-commercial scale, and an estimate for the purpose is under preparation.

Since writing the above an estimate has been submitted to the Chairman of the Board of Industries and Commerce.]

GOVERNMENT AND SCIENTIFIC SERVICES IN INDIA.*

BY SIR P. C. RAY, D.S.C., Ph.D.

WE stand to-day at the threshold of a critical period in the history of our country. The war has happily terminated, and we are in the midst of rejoicing over the Peace Celebrations. It has been truly said that the late war called for every ounce of scientific knowledge and effort, that the great nations have been straining their utmost and that the scientific battle has been fought by the laboratory men. Indeed, it was from the nitrogen of the air out of which Germany manufactured synthetic nitric acid and thus defied the world for four years and more in spite of the stringency of the blockade. It is now becoming abundantly clear that the fate of a nation will henceforth depend more upon the achievements of its students of science than upon the skill of its generals or the adroitness of its diplomatists and statesmen. Let me illustrate what I have said by a concrete example. The first thing which America did, when she joined the Allies, was to initiate a census of chemists, and in July 1917, a fully detailed description was available of some 15,000 chemists resident in the State, and a research staff consisting of 1,200 technical men with necessary assistants was enlisted for the research division of the chemical warfare service alone.

Peace hath her victories no less renowned than war. The sudden and unexpected stimulus which chemical research obtained during the war has been the means of calling into existence a trained band of workers especially in the Allied countries. In England, for instance, vigorous attempts are now being made to manufacture dyes and fine

chemicals backed by heavy subsidies from the state and countervailing duties. It now transpires, however, that Germany, though worsted in the war and her resources enormously crippled has had her chemical plants practically unimpaired and her army of chemists undiminished in vigour. It is suspected in fact that she is already putting forth mighty efforts to oust her rivals and capture her lost markets. England's pre-occupation has also been America's opportunity. During the first three years of the war, secure in her envied neutrality, she reaped a golden harvest by selling raw materials and munitions to the belligerents, and her chemical industries have got such a fillip that in the near future the Indian market bids fair to be flooded with heavy and fine chemicals and dyes manufactured in America. By a bitter irony of fate, England has materially helped America in this respect.

Emerson says somewhere that a chemist will readily confide his secrets to a carpenter, secrets which he will not impart to a brother chemist for all the world. The accumulated experience of generations of English and French chemists was thus gained by America at almost a bound. Japan has not been slow in stealing a march over us: her volume of exports to India has trebled within the last two or three years. The question now arises; Where does India stand in this formidable world competition? My answer is, nowhere. It is sad to reflect that nothing short of the cataclysm of the late Armageddon could rouse us from our stupor and make us realise that like so many other countries, India must be not only self-contained in the production of her own requirements, but learn to convert vast supplies of raw-materials into manufactured products. India has now an enormous amount of leeway to make up. We must now put forth all our energies and make vigorous and sustained efforts so as to be able to stand a fierce world competition.

* Presidential address delivered to the Indian Science Congress at Nagapur on 13th Jan, 1920.

INDIANISATION OF SCIENTIFIC DEPARTMENTS.

After pointing out that want of general education is a bar to scientific progress, the President continued: I feel it my duty to take a rapid survey of the future of science in India, and suggest steps which ought to be taken for the proper culture and development of science in India. By this I mean that educated Indians should take a greater part in original investigations, and steps should be taken for the diffusion of scientific knowledge among the rank and file of the people. The cultivation of science must be entrusted, as is the case everywhere in the civilised world, to the professors in colleges and universities, to the teachers in the secondary schools, and to the officers in the various scientific departments of the State, and there must be a good proportion among the *intelligentsia* in the country to take interest in the pursuits of science and encourage its votaries. The visions of the early educationists, in this respect, have proved quite illusive; the contribution to science by Indians has been extremely meagre. Japan entered the race some thirty years after India, but by what a vast distance she has left us behind! Within the short period of forty years, she has built up an educational system which is the admiration of the civilized world, while her contributions to science have been very valuable, and are daily growing in volume and importance.

Let us now see where the fault lies. The Scientific Services of the Government are posts of great value, prospect, and security; they afford to their holders unique opportunities, rare and valuable materials, for study and investigation. But with what studied care the Indians are excluded from these Services will appear from the following table compiled from a recent Government report:

The following Table shows the composition of the existing Scientific Services.

Name of the Service	OFFICERS AVERAGE PAY (IMPERIAL GRADE) OF			
	Europeans	Indians	European	Indian
Botanical Survey ...	2	0	1,000	0
Geological Survey ...	16	0	1,010	0
Zoological Survey ...	3	1	970	700
Agricultural Service ...	38	5	1,000	460
Forest Service ...	9	1	1,040	660
Medical and Bacteriological Service (on Civil Employment) ...	24	5	1,220	520
Indian Munitions Board	11	1	780	300
Meteorological Department ...	10	2	970	770
Veterinary Department (Civil) ...	2	0	1,100	...
Education Service * ...	34	3	910	490
Indian Trigonometrical Survey ...	46	0	..	...

* The Indian personnel has been recently strengthened by certain fresh appointments.

All of these officers except one are Royal Engineers, and hold military rank. The provincial service, which is also highly paid, consists of 112 officers, of which nearly 80 per cent are Europeans and Anglo-Indians, without any academic distinction.

Among the occupiers of these posts, there have been many distinguished European servants of great name and fame. I do not for a moment wish to minimise their achievements. The credit of their work, however, belongs to their own native countries, and the results of their experience are enjoyed by their own countrymen. I shall try to make my point a bit clearer. The Indian lives and moves and has his being in the midst of his own people; the European, somehow or other, lives in a world apart, and from his exalted position of aloofness and isolation fails to inspire those who may happen to come into

contact with him. Moreover, the European, when he attains the age limit, retires to his own native land, and the accumulated experience gained at the expense of India are lost to the country for good. In a word, the present system arrests Indian intellectual growth and inflicts a cruel wrong on India.

In Japan, on the other hand, western experts were at first imported for organization of the scientific services; but they have gradually been replaced by the Japanese scholars. Japan can thus shew an Omori in seismology, a Kitasato in bacteriology and a Takamine in biological chemistry, not to mention a host of other eminent names.

In India, however, taking, for example only one instance, the Trigonometrical Survey is entirely reserved for and manned by Royal Engineers with military rank. I do not see why this should be the case. In England, France, and Germany, civil graduates with scientific qualifications are being employed in increasing numbers. Even in India, in the early fifties of the last century, we find that Radhanath Sikdar, an alumnus of the old Hindu College, was the right-hand man of Colonel Everest, of the Trigonometrical Survey, from whom the highest peak of the Himalayas has derived its name.

In order to make India self-contained, the Government has proposed to institute a Chemical Service. Probably in the near future, departments of aerial navigation, marine engineering, including naval architecture, will have to be organized. The utilisation of Indian brains in these departments should be regarded as pivotal.

Coming now to the second point, *viz.*, the contribution to science by Indian professors, the result has been disappointing so far as the Government service is concerned. And for this the service system is responsible. Take for example the Chairs in the Presidency College of Calcutta, probably the premier College in India. The Chairs are as well paid as any in the world, and the advantages and facilities afforded to the professors

are the best available in India. There is sometimes the honoured tradition of an Eliot or a J. C. Bose or a Pedler connected with some Chair. Naturally when a vacancy arises, the aim should be to fill up the posts by able and enthusiastic workers on the subject so as to preserve the tradition and the continuity of the fame attached to such a post. But what happens under the service system? Either a raw, untried graduate is brought out from England or it automatically falls to some senior man in the service whose only title to the post is his seniority, which often goes hand-in-hand with senility. In ninety-nine cases out of hundred, the successor so chosen, has no single original work to his credit, and may have lost all touch with the progress of his subject. Enormous facilities at his disposal thus remain unused as long as he encumbers that post.

It would be interesting to examine the condition of things in such free countries as are unhampered by hide-bound and fossilized system. At Cambridge Rayleigh succeeds Maxwell, J. J. Thomson succeeds Rayleigh, and Rutherford succeeds J. J. Thomson in the post of Cavendish Professor of Physics. Again take the method of selection of College and University professors in Italy as described by Dr. Young:—"The Committee of the most famous professors in the subject in which the Chair is vacant, appointed by the Government *ad hoc* to report on the various candidates, is only allowed to consider the work done by the candidates during the five years immediately preceeding the election. And it is only in the case of candidates of world-wide reputation that work anterior to this period is even tacitly assumed. The excellence of this procedure has secured for Italy a succession of brilliant professors, who more than hold their own, when the resources of the country are considered."

The selection of men for professorships in our country lies entirely in the hands of a few big officers. In the case of the lower services, it is the India Council. It is a

continuation of the old Nawabi system. Generally the Directors, or the officers of the Selection Bureau, are men who might have achieved some academic distinction at some period of their career (but this is not always necessary), but having taken to administrative work for long years, are entirely out of touch with the progress in the different branches of knowledge. Such officers are by habit and temperament unfitted to judge the merits of rival candidates, and generally very unfortunate selections are made. The evils of the present method of recruitment to the posts of Professors have been pointed out by the Calcutta University Commission who have suggested organization of teaching work on a professorial rather than on a service basis.

The authorities in this country are never tired of singing the praise of men trained in the West. In practice, however, even a third class man of London, or a pollgraduate of Oxford or Cambridge is preferred to the best of Calcutta graduate including Premchand Roychand scholars, or Doctors of Science and Philosophy,—men who have proved their merit by publishing original works in the pages of the journals of learned Societies of the West. The folly of appointing a raw, untried graduate to the charge of a College or University Chair is thus expressed by Dr. Young :—

“In England, on the other hand, a large proportion of the Chairs at the chief Universities are held by men who, at the time of their appointment, would have been regarded on the continent as, at best, promising young students. These men have continued to hold the same posts for twenty years or more, and will continue to hold them till the time comes for their retirement when such retirement is obligatory. Some of them will die in harness and will, at the moment of their disappearance from the scene, still have nothing to point to but their original academic success at Cambridge. There are, of

course, notable exceptions, but it is still unfortunately the case that the majority of professors and lecturers in the Universities and Colleges of England are men of this type.”

POTENTIALITIES OF INDIGENOUS TALENT.

A signal proof of what can be done by Indians, when they are allowed to work under a healthy and free atmosphere, is afforded by the University College of Science, Calcutta. This College grew out of the magnificent and princely gifts of Sir Rash Behari Ghosh and the late Sir T. N. Palit, and was established in 1916; but owing to limitation of funds, the laboratory, the library and the workshop could not be properly organized. In spite of these discouraging conditions, it is the only institution which has shown anything like life and activity as evidenced by the output of original contributions published in the leading scientific journals of England and America. During the academic year 1918-1919, there were seventeen original contributions from the department of Applied Mathematics, twenty-four from the Physics department, and twenty-one from the Chemistry department. Yet this promising institution is treated like a charity boy by the Government and has had only miserable doles ladled out to it.

What little has been done by them only goes to prove their potentiality, their latent capacity for the work to be undertaken in the future. It is, therefore, necessary that steps should be taken to allow Indians to stand on their own legs. They should not be in perpetual leading strings. The policy which has hitherto been the guiding principle is that everything should be done for them and nothing by them, and this goes to explain their virtual ostracism from the higher responsible posts in the various Scientific Services. A vast amount of ability and potential energy is thus allowed to run to waste. Japan has all along followed a course which is the very reverse of that adopted here and with what happy results I need not say. A self-contained India, such as the Indian Industrial Commission looks forward to, presupposes that the experts, specialists and workers which the industrial awakening would demand should be created within her own borders.

Considered from every point of view the progress of scientific knowledge is imperatively

necessary to our individual and national growth. For the accomplishment of this object the whole-hearted co-operation of both the Government and the people is indispensable. While the Government must be more liberal in its grants for the cultivation of science our public-spirited and patriotic countrymen have also a duty to perform. Science owes a great deal to the millionaires of the world. In our country too the examples of Tata, Palit and Ghosh are not wanting. I stand on the platform of a city which is the home of a thriving cotton-industry. Here we have merchant princes and successful mill-owners and business-men. The great philanthropist, Andrew Carnegie, himself a self-made man, acted on the motto that "to die rich is to die disgraced" and gave away more than one-hundred crores mainly for workingmen's reading rooms and research institutes. I appeal to our wealth and eminence to follow in the footsteps of the great benefactors of men and I am sure that with their help the cause of science will flourish. The colleges where, at present, Indian votaries of science carry on their modest and humble researches have got to be multiplied many times over. More attention should be given in each University now existing in the country to the cultivation of pure science, particularly physics and chemistry, and more colleges and institutes should be established all over the country for the study of applied science. It must not be forgotten that the present industrial paralysis of the West offers a golden opportunity to the East to wake up. And if India by the grace of God, will avail herself of this opportunity to raise equal to the occasion, if her men of science and industrial pioneers will put their shoulders to the wheel together, if the study of physics and chemistry, of mining and engineering, of marine and aerial navigation and of the biological sciences will succeed in enlisting on their behalf the energy and enthusiasm of thousands of votaries, if the young men of the middle classes will crowd in great numbers the science colleges and the technological institutes more than the law colleges, if the scientific services of the State be thoroughly Indianised, if her rich men will award more scientific scholarships and establish technical schools, India will not take a long time in coming to the forefront of nations and making her political renaissance not a dream but a reality.

MYSORE EDUCATION MEMORANDUM.

BY S. SEETHARAMAIIYA,

Member, Mysore Legislative Council.

BEFORE stating my views and suggestions on some of the chief points involved in the subject I cannot but express my feeling of gratification at the liberal policy of the Government of His Highness the Maharaja of Mysore, with regard to the imparting of education to His Highness' subjects; and at the very able and exhaustive proposals for the improvement of education in Mysore presented by Mr. C. R. Reddy.

PRIMARY EDUCATION.

(i) The proposals for the future development of primary education and for the distribution of schools outlined in the memorandum, pages 3 to 7, seem to me to be in the main sound, and I generally agree.

(ii) The proposal for providing a school for every 600 population seems to be rather unsuitable for *malnad* tracts, where houses are situated far away from each other and the population thinner, whereas the same proportion for *maidan* tracts where opposite conditions are prevailing would be more than necessary. It would be more expedient to reduce the number for *malnad* parts say to 400 and raise it in *maidan* parts to 1,000.

(iii) Further, the primary grade schools should contain the 'Infant classes' and 'the three higher standards' as proposed by the Government and the aim of the teaching should be not only to make the pupils understand the 3 R's. so as to enable them to obtain a working knowledge of Kannada, but also to arouse and develop a spirit which is innate in children generally of enquiry into

and observation of everything that is around them in nature, so as to develop original ideas and thoughts which is very much hampered under the existing system of Primary Education.

COMPULSORY EDUCATION.

(i) The defects of the present compulsory education are very well brought out by Mr. C. R. Reddy. They are at once true and convincing. Some of those defects are irremediable and in a way it strikes me that instead of continuing such a system with its attendant defects it would be better to abolish the scheme altogether in view of the fact that the primary schools will be increased and facilities for education will be brought thereby nearer home to people.

(ii) Even after the proposed 10,000 primary schools are established and the Compulsory Scheme extended even to the rural areas, it will not be possible to bring each and every boy under the scheme and the defects pointed out by Mr. Reddy, will yet be existing.

(iii) Should it be considered as not expedient at this stage to do away with that system altogether, I think that there should be no independent school committees. But the Municipality should appoint special sub-committees for the control of the Compulsory Education. Unless Municipalities undertake financial responsibility for Compulsory Education, this cannot be done.

(iv) It is also necessary to raise the compulsory age to 12 at least, if not to 14, so as to bring within the scope of compulsory education also the literary and vocational instruction imparted in the Middle Schools so that the pupil may not relapse to illiteracy, as is the case hitherto in the generality of short course cases.

(v) Local bodies should be vested with larger control over village Elementary Schools.

(vi) The principle laid down on page 10 of the memorandum as regards distribution

of Educational Finance between the District Board and the Government is sound and may be adopted.

SECONDARY EDUCATION.

MIDDLE SCHOOLS.

(i) There are now two distinct types of Middle Schools, viz., Vernacular and Anglo-Vernacular Middle Schools. The former leads nowhere and as such should be abolished.

I am in favour of having only one type of Middle Schools where all instructions are given through the medium of Kannada, where education should proceed automatically from grade to grade and where both Kannada and English should be made compulsory, exception being granted only to such as desire to take a higher Oriental course or as do not wish to continue their studies in the High Schools or University.

(ii) The Middle School course must be lengthened in order to make it efficient. It should be one of four years following the III standard Vernacular, provision, however, being made for admitting deserving students to 2nd year class of the Middle School course if found qualified after leaving the primary schools so as to enable the industrious and well taken care of students to shorten the Middle School course by one year. English may commence in the Middle School course. English is unnecessary in the primary schools.

(iii) Science of a rudimentary nature, useful in every day life, and drawing should be taught in the middle schools.

(iv) The financial scheme outlined on page 13 of the memorandum for the increase and improvement of A. V. Schools may be adopted.

HIGH SCHOOL.

(i) In view of the waste of brain power and time and the imperfect assimilation of knowledge involved in the present system and also in view of the fact that the

end of Education is rather the development of the faculties than the power of expression in a foreign language, I am in favour of the introduction of the vernacular, that is (Kannada) as the medium of instruction in High Schools. If the vernacular, viz., Kannada be the medium of instruction, it will also largely facilitate mass education and the education of women.

POLITECHNIC TYPE OF SCHOOLS.

(ii) The principles laid down on page 17 of the memorandum in order to introduce an efficient system of practical instruction seem to me to be very sound and may be adopted.

TECHNICAL EDUCATION.

(iii) The measures recommended on page 19 to improve industrial education in the State seem to be very sound and should be undertaken.

AGRICULTURAL EDUCATION.

(iv) As regards the agricultural instruction, the suggestions made on pages 20 and 21 of the memorandum may be given effect to fully.

COMMERCIAL EDUCATION.

(v) The curricula of commercial courses and examinations proposed by the sub-committee appointed to consider the subject may be adopted.

(vi) Industrial schools should be under the control of the Director of Industries and Commerce since their utility depends upon their connection with the general industrial requirements of the country and their working on commercial methods.

EDUCATION OF GIRLS AND WOMEN.

(i) The two outstanding questions in respect of women's education are medium of instruction and the revision of the curricula.

As regards the first arguments in favour of the vernacular, i.e., Kannada medium apply with double force since the period of school life in the case of girls is very short.

As regards the second, subjects suited to the needs of women should be introduced. Subjects connected with the household management, maternal responsibility as also music, and drawing and painting should be given a permanent place in the curriculum, having regard to the peculiar customs and mode of life of Indian women.

(ii) The curriculum of subjects of girls up to the Lower Secondary Examination as drawn up in Appendix D is well adopted for their requirements. Beyond this there seems to be no necessity to differentiate between the courses of studies for girls and boys. There can be no made-easy for culture and learning and it would be impossible to infuse all the required knowledge to the girls in a shorter time than their brothers take to acquire the same. Miss. Rukmini-amma's views on the subject seem to be quite acceptable.

As the memorandum rightly observes the more urgent question is the expansion of education among girls up to 12 years of age. The provision made for the increase of primary schools will, it is hoped, meet the requirements.

THE EDUCATION OF SPECIAL COMMUNITIES.

(i) *Mahomedan Education.*—There need be no separate organization for Mahomedan education. Mahomedan boys should learn Kannada as it is necessary for their advancement. Mahomedan boys may receive their education along with their Hindu brethren in the same primary and middle schools, special teachers being appointed to teach Urdu in these schools. This will widen their outlook and contribute to their progress, besides bringing the Hindus and Mahomedans together from their infancy and make their tie stronger for their commonweal.

(ii) *Education of Backward and Depressed Classes.*—The concessions offered, the scholarships instituted, and the various

measures adopted as outlined in paras 27 and 28, pages 27, 28 and 29 of the memorandum will go far towards encouraging education in these communities.

TRAINING INSTITUTIONS.

Considering the rapid expansion of education in the State, there is a great paucity in the number of trained teachers. Ways and means must be found for training 1,600 teachers per annum, the number arrived at, as necessary, in the memorandum.

ADULT EDUCATION.

The night schools require more adequate supervision and control. At present pupils make no progress. Under better inspection their efficiency may be increased.

DIRECT MORAL AND RELIGIOUS EDUCATION.

(i) This has hitherto been not productive of beneficial results. For want of competent teachers and suitable books the teaching has been soulless.

(ii) It is quite necessary to make the curriculum of religious and moral instructions an integral part of the course of studies. Compilation, or preparation of suitable books if called for and encouraged would be easily forthcoming within a short time. So also the teachers.

(iii) The principles of Hindu Religion common to all the Hindus should be taught as a compulsory subject. Provision must be made for the teaching of the pupils of any particular persuasion, if sufficient number of students are forthcoming.

PUBLIC EXAMINATION.

A primary grade examination would be very welcome to standardise the teaching in the whole State, but it should not be a public examination nor should it put the students into any extra cost or strain.

SCALE OF PAY OF EDUCATIONAL OFFICERS.

While the pays of almost all the teachers, Head-masters and others are raised in a

reasonable manner it is really very disappointing to read that the pay of the poor pandits, drawing-masters and gymnastic teachers should be left as it is. These persons contribute not a little to the successful training of the pupils in their charge while their over acquirements especially of the pandits are as valuable and useful as those of the graduates of universities. The salaries of the pandits must be raised to Rs. 100 in all High Schools and those of the others also suitably.

DEPARTMENTAL PUBLICATIONS.

While giving every encouragement for the publication of books in Kannada on technical subjects, the publication of books in Kannada language and literature seem to have been overlooked. Till some time ago 'Karnataka Kavya Kalanidhi' was enriching the Kannada language by publishing rare and excellent Kannada Works of old authors. Such a valuable journal has now ceased to exist, because as I learn the Government withdrew the support that was till now being given to it. Such journals should be given every support and suitable provision should be made to ensure the continuance of such invaluable publications.

CHANGE OF BOOKS.

The present system of frequently changing books in most of the subjects such as Mathematics, Grammar, Composition, History, Geography, Science, etc., both in Primary and Secondary courses, has the drastic effect of unsettling the acquisition of steady knowledge and a steady impression of ideas in the tender minds of the young students not to speak of the unnecessarily additional costs and worry to the poor students and their poor parents. There must be a standard text-book on each subject, one set for the Primary and another for the Secondary courses. These books ought not to be changed at all for at least eight to ten years. Any new change or improvement in these

subjects that may happen to come into existence by other publications must be studied by the teachers and taught to the students by means of notes on such subjects. By this method such wholesale changes as would necessitate of books themselves are not likely to occur for a number of years.

Similarly the recent change necessitating a multiplicity of uniform exercise books for all classes on all subjects, has become almost a daily concern, worry, and waste of money to poor parents and students without the corresponding advantage to them. This also must be curtailed in higher classes below the 2nd class whose exercises and examinations should be confined to slates only.

ANOTHER MATTER OF PUBLIC INTEREST.

I cannot refrain from alluding here to the great inconvenience felt on account of their honest religious objections in various parts of the State by certain sections of His Highness' subjects, by being obliged to withdraw their children from the Government Schools and in some cases from education itself wherein regardless of their long long standing honest religious sentiments panchama boys were admitted under a recent circular of the Inspector-General of Education.

This seems to me to be against the policy of all the good Government. In the new scheme it would be better to provide for separate schools for panchamas as hitherto and thereby remove the cause of the present difficulty and the uncalled for hardship.

The panchamas may be educated separately in such a manner and for such a time as would enable them to help themselves and to have all the enlightened good ideas of life and living; so that they may be equally useful citizens as other classes of the public which is all the object of every good Government.

In conclusion, I add that the subjects of His Highness the Maharaja of Mysore will gratefully welcome the liberal proposals set

forth in the memorandum for the spread of education in the State, and will co-operate with the Government in working out the same.

II.

Rev. A. R. FULLER, B.A. (Lond.)

Among the many interesting and important subjects referred to in the Memorandum on Education is the subject of the medium of instruction. So far as Primary and Middle Schools are concerned it is generally agreed that for all subjects except English and Arithmetic the vernacular is the most suitable medium of instruction.

There is, however, considerable difference of opinion as to whether this practice should be extended to the High School stage.

In *theory* it would seem more natural for education to be imparted in the mother-tongue of the student, and national *senti-*
ment might seem to favour such a course, but, as Mr. Abdur Rahim said in his Convocation Address, every care should be taken not to sacrifice the interests of sound education for the sake merely of sentiment, and if we consider the actual condition of things in India as a whole, and in Mysore in particular, it seems to me that there are a number of considerations which make it difficult and undesirable to make the vernacular the medium of instruction in Secondary Schools.

1. It has to be remembered that even such a comparatively small area as Mysore is not homogeneous so far as language is concerned. In Bangalore for example, Kannada, Tamil, Telugu, and Hindustani are all widely spoken, while in some parts of the State, Telugu or Hindustani is the prevailing vernacular. If, then, the vernacular is to be the medium of instruction, either schools for the different vernaculars will have to be opened, or numbers of students will still be unable to be taught in their mother-tongue unless they leave the State for their education.

2. But, in addition to difficulty with regard to pupils, there will be great difficulty in regard to *teachers*. At present, some of the best teachers are gentlemen from outside the State, or gentlemen from inside the State whose vernacular is not Kannada. Even as things are now there is great difficulty in getting a sufficient number of qualified teachers for existing schools, and, if the supply is to be limited to Kannada speaking men, the difficulty will be very greatly increased. It is futile to say that all such teachers must learn Kannada, for most of them will seek employment elsewhere, and even if not, what are schools to do while such teachers are learning Kannada, especially as such a contingency may arise whenever a new appointment is made?

3. It is very doubtful whether *public opinion* is in favour of making the vernacular the medium of instruction in High Schools. It may be said, by some, that public opinion is uninformed, and that the public do not know what is good for them, but I venture to think that it is wiser to inform public opinion and create a demand before introducing so radical a change. It is certain that, rightly or wrongly, many people think that the suggested change would be detrimental to the study of English. A good test of public opinion would be to introduce the change in certain High Schools only, give them as good a staff and equipment as possible, let them prepare students for the S.S.L.C. examination, and let the papers in that examination be set and answered in either the vernacular or English. I believe that most of the advocates of vernacular as the medium are averse to such a course as they fear that if the public are given a choice they would choose the English school.

4. Among other considerations which may be mentioned are the following:—The introduction of the vernacular as the medium of instruction in such subjects as Science, Histories, Economics, Commerce, etc., would

lead to the prevalence of a very 'pigeon'-vernacular habit of speech much to be deprecated in the interests of the vernacular itself. Then again, it is very doubtful whether suitable text-books in the higher branches of study are procurable in the vernacular, and still more doubtful whether there are, or are likely to be, a sufficient number of satisfactory *books of reference* in the different subjects.

Personally, I think that the difficulty of learning through the medium of English is often greatly exaggerated, and certainly it is not true to say that India is the only country where pupils are being educated in a language other than their mother tongue. I believe that in America, and to a certain extent in Japan, there are numbers of pupils who are being educated in English rather than in their own mother tongue.

For all of these reasons, while I am in full sympathy with all movements that aim at the improvement of vernacular study, I think that it would be a retrograde step to make the vernacular the medium of instruction above the Lower Secondary standard.

It is interesting to read a brief para on fruit experiments in the Report on Agriculture in Assam during 1918—1919. The Report says:—The Fruit experiment station at Shillong has continued to make satisfactory progress. The total area of the garden is 62 acres, and out of about 30 acres, which are suitable for fruit growing, 28.75 acres have been planted. Good fruit, including numerous varieties of apples and pears, has been produced and about Rs. 900 worth of fruit was sold locally during the year. Arrangements are being made to have grafts supplied from the station for use in the Khasi and Jaintia Hills. The results are promising.

ECONOMICS IN THE WEST.

Orientation of Labour.

London, 20th November, 1919.—We are still slowly but we may hope surely emerging from the troubles of the War period. The signs of improvement are many. Trade is brisker, money is more plentiful, prices though not lower are more stable, and finally, and most important of all, Labour is more placable. We are warned by competent observers that there are still storms ahead, and I think that is the case. But we are more prepared than we were for industrial trouble and if it comes it will not hit us so badly as it has done in the past. Undoubtedly things are moving towards a new Orientation of Labour to adopt a familiar diplomatic phrase. The agreement just concluded with the Railwaymen's Union is most significant in this connection. In future the Railways of the country are to be under the control of a Board of ten formed as regards five of railway general managers and as regards the other five of delegates appointed by the Railwaymen's Union. This, it is almost needless to point out, is a revolutionary departure from the old system in which the companies were managed by Boards of directors with autocratic powers over their employes and it is a long way in advance even of the War system in which a Board of general managers assisted by Government officials controlled the railways. In fact, it is practically guild socialism, a system of Labour development supported by the extremest advocates of the rights of Labour. Under the guild system an industry is worked by guilds on behalf of the workers. The workers are in sole control and their interests are paramount. It is not difficult to see how oppressive such a system may be made to the general body of consumers who through enhancement of prices

of necessary articles or services may virtually be made to support a monopoly run in the interests of the comparatively few. In the case of the railways it may be urged that the workers have only half control. That is true, but who imagines that they will stop at that in the case of an organization like the railways or of an industry like mining where outside competition is not a serious factor? For my own part I have very little doubt that we are moving rapidly towards that nationalisation of the means of production and distribution which is the goal of the socialist. It will be a tremendous leap in the dark and once the step is taken it will scarcely be possible to retrace it. A consoling thought is that long before the main issue of nationalisation has to be decided we shall have experience of the earlier experiments with the railways and mines to go upon. If there is a very bad record, as there may very well be, the nation will be able to set the principle. The question is one of such transcendent importance that I cannot imagine it possible that a final derision will be made until there has been an appeal to the country.

How selfish and monopolistic are the tendencies of modern Labour in this country is shown by the manner in which the Trade Unions are dealing with the question of female labour. During the war over a quarter of a million of women were employed in various industries some of them in positions of great responsibility and all working on lines usually followed by the ordinary male workers. Naturally it was assumed that these often highly self-sacrificing women when the war concluded would if they cared to remain at work be permanently employed. But those who expected this were reckoning without the exclusiveness of the Trade Unions. A report just issued by the Women's Industrial League which has been making inquiries on the subject shows that of the quarter million women originally employed only 79,000 were in the workshops

at the end of May last and that this number was rapidly dwindling because the Unions would not allow the women to be employed. One firm wrote as follows to the Society on the subject :

Since the armistice, the Amalgamated Society of Engineers has insisted upon our dismissing the women working on armature work, because we were not employing women in the same room or department as formerly. We don't think the decision was a fair one, and we make our protest accordingly, but without avail. We venture to express the opinion that women's work is infinitely better than men's for many branches of our work.

We are more than pleased with the loyalty, cheerfulness, and willing service of the women in our employ. They are unquestionably an example to the male labour, practically without exception.

We intend to keep women as long as allowed, for they have given complete satisfaction and are displacing no men.

It is hardly necessary to comment on the spirit here revealed of the mind of Labour as it is directed by the Trade Union leaders. The old mediæval Guilds usually cited as monumental examples of selfishness were not more narrow in their exclusiveness than the up-to-date Labour organizations are showing themselves to be. It is their tendency which excites the greatest apprehension for the future of British industry. For the full development of our resources free trade is just as necessary in the sphere of artisan employment as it is in the wider region of international competition. Under modern conditions what possible future can an industry have which is hedged round with a high wall over which no one can climb who has not first passed through the extremely fine sieve of the Trade Union's laws. There is the less excuse now for the barriers raised because all the world is crying out for British goods and manufacturers do not find it possible even to a limited extent to keep pace with the demands they receive. A striking example of the mischief wrought

by the curious obtuseness of the Trade Unions to the needs of the time is supplied by the action of the Bradford wool-workers who for weeks resolutely declined either to do overwork or to permit the employment of female labour though the demand for the Trade's goods was never greater. When these things happen one is almost disposed to question whether the British worker will ever rise to the necessities of the present unexampled situation.

AN IMPORTANT MOVEMENT.

An important movement has just been inaugurated by the Royal Colonial Institute which if it is well supported, as it is almost certain to be, is likely to have a far reaching influence on the economical and industrial development of the Empire. The scheme in question aims at the placing of Colonial students who have finished their University course in large manufacturing works in this country to receive their technical training. There is, of course, nothing new in the reception of youths from the outer marches of the Empire in the leading factories and engineering establishments of Great Britain. One of my earliest recollections as a boy—now alas! more than a half century ago—was of meeting daily on my way to school a number of Indian students who were being instructed at the extensive works of a leading firm of railway engineers. But these isolated and spasmodic efforts were very different from the extensive and systematic introduction of students now contemplated. On both sides—in the Dominions as well as in Great Britain—influential aid is enlisted for the scheme and there is every reason to suppose that it will develop into a great organization of wide scope and potentiality. India is not embraced in the arrangement, but obviously she is deeply interested and ought not to be left out. Those concerned will be wise if they take the necessary steps to secure her inclusion.

CIVIL AVIATION.

General Sykes's report on the future of Civil Aviation contains much interesting information relative to the development of aviation since the war. We read of the careful production of weather maps and aerial charts, of experimental aerial light-houses and of the establishment of a system of wireless telegraphy by which aeroplanes may be in continuous touch with the aerodromes below. — A striking set of figures

given in the report shows that the civil aviation system has been attended with a minimum of accidents since its introduction. Thus, though there were no fewer than 21,000 flights recorded, 52,000 passengers carried and a mileage of 303,000 flown there were only thirteen accidents and only two of these resulted fatally. General Sykes fore-shadows the development of Civil Aviation on lines analagous to those of the mercantile marine so that in time of war the regular forces of the Crown could be speedily reinforced by a large body of highly efficient men. He does not anticipate that there will be any very great scope for the carriage of mails by aeroplane in Great Britain owing to the comparative shortness of the routes but for Continental and overseas purposes he looks for a great future for the flying arm. His final conclusions are concerned with the financial position of the industry. He points out that at present the industry cannot stand alone and he advocates a system of subsidies based on actual weight carried and miles flown in order that the difficult initial period may be successfully tided over.

Japan's action in accepting, with some reservations, the provisions of the International Labour Charter with reference to children has exerted a good deal of comment here. What will India do? People are asking. The question may be answered before these lines reach their destination, but it may be recorded that there is a confident expectation that India will have to come into line on this question if she is to act up to her duty. At the same time the wide differences in customs and domestic habits between the East and the West are a factor which cannot be ignored. Here a woman doing hard labourer's work is almost an object of pity. In India the female cooly is a common figure. Some of the points of divergence can doubtless be reconciled, but in the main it will probably be found in the long run in this as in other matters that "the East is East and the West is West." Where agreement will be possible and salutary will be in establishing a uniform system of protectors of the workers from accident and in establishing a uniform standard of treatment as regards housing and welfare.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

The Romance of the Telephone.

Washington, D.C., U.S.A., Oct. 28, 1919.—Alexander Graham Bell, the inventor of the telephone, who resides in Washington, says of himself that he is no business, and that he has no interest in the commercial side of an invention. But he was so fortunate as to have associated with him in the early days of the telephone men who were able executives and business men, and who not only made the telephone a commercial success equalled by but few enterprises in the world, but safeguarded the inventor's interests so that he, too, received benefits from the commercial side of his invention, he being to-day a man of large wealth.

To-day, in his seventy-third year, Dr. Bell is keenly interested in science and invention and is hard at work on many different problems, although no longer engaged in telephone research.

The genesis of the invention of the telephone is intensely interesting. Inventions or discoveries are all in one of two classes—they are either accidental or they are the direct result of experiment and investigation, trying to find a means to produce a result the possibility of which has first been admitted in the mind.

The telephone was of the latter class, as, indeed, many of the great inventions of the world have been, such as the air brake, sewing machine, electric light, cotton gin, reaper, etc.

The theoretical possibility of the electric transmission of sound over a wire was probably realized before Morse demonstrated that signals could be sent. But to recognize that a thing is possible is one thing—to do it is quite another. Thus Langley knew that mechanical flight was possible—he even

accomplished it with a small model (and by the way that historic first flight of a heavier-than-air machine on the Potomac River just below Washington was both witnessed and photographed by Dr. Bell, who has ever since been intensely interested in aeronautics and has himself contributed largely to its advancement). But Langley did not know how to get his machine into the air. Reis had experimented with a make-and-break current in the mistaken idea that the voice could be thus reproduced. *Sound* can be so reproduced, but not *speech*, as we now know. Dr. Bell conceived the idea that if an undulatory current could be produced, which was continuous, not intermittent, which would follow in its fluctuations the fluctuations of the human voice, it might reproduce that human voice at the other end of the wire.

At the same time he was experimenting in a field which all his life has been that nearest his heart: the aid and instruction of the deaf and dumb. He was endeavoring to produce, by transcriptions of the human voice through a vibrating diaphragm and needle, a record which could be read visually by the deaf. But a comparison of such records, made on smoked glass, with the formations of the manometric flame, under the influence of the voice, showed him that his apparatus must be far more delicate and responsive if it was to be accurate. So he visited one of the country's leading surgeons, and asked him to teach him more about the human ear that he might make a diaphragm as small, as sensitive and as accurate as the ear-drum.

"Why not use a real ear?" suggested the surgeon.

"Get me one," was Dr. Bell's answer.

"So he got me one." Dr. Bell tells the story with much interest. "He got me a human ear and cleaned it up nicely. I attached my little bristle to one of the small bones, made an ear shell, and there I would sit for hours and hours at a time shouting

into that dead subject's ear, getting records. Then it occurred to me one day to wonder at the fact that the tiny little drum could move the relatively heavy bones of the ear as it did. And if an ear-drum could move a bone a great many times its own weight why couldn't a diaphragm membrane move a relatively heavy piece of iron? Right there the idea of the telephone was born. And there I was, at work again at my other line of work, and the sensitive diaphragm with the little piece of soft iron vibrating in front of a magnet was the result—and the principle of the telephone was established. About ten months later I eliminated the battery and substituted an all-iron diaphragm for my membrane with an iron center, but the principle remains the same to-day—the undulatory current which reproduced similar vibrations in a similar apparatus at the end of a wire."

The writer often talks with Dr. Bell in his secluded office in the American Security and Trust Co. here, of which organization his son, Charles J. Bell, is the president. Dr. Bell knows a thousand stories of the telephone in its early days. "You ask for telephone stories. I will tell you one," he said to me. "You know, of course, that the telephone is used in surgery, in connection with locating foreign bodies in the body? Well, last summer our government lost a whole boatload of iron in the ocean near Nova Scotia. Boat upset. And, of course, there wasn't any way of marking just where it went down. So I hung a brass bar at the end of a telephone wire, connected it up, and dragged for the lost cargo. And in a short time we located it with my submarine telephone surgical probe. I think it was quite fitting that the inventor of the telephone should use it that way. In a short time I have planned to try to locate a wrecked iron ship the location of which no one knows, and it will be located in the same way, of course."

Thus the telephone story—a single patent forty-three years ago—a world-girdling system

of wire and instruments to-day! Over eight thousand patents registered in the United States patent office, all connected with the telephone, with billions in money created on the industry they created—and the one man responsible for it all using his own invention to find a lost cargo, and much of the money he has made out of his brains to investigate other problems—boats, aircraft, longevity, helping the deaf and dumb.

Using the telephone is as commonplace as breathing. But give the magic of the growth of the industry which sprang from one small patent a thought the next time you lift the receiver and call for a number.

WASTE PRODUCT OF RICE NOW USED IN SUGAR REFINING.

In the sugar refining process of to-day raw sugar is put through large cylinders filled with bone black. The latter consists of pure carbon, suspended upon an infinitesimally thin skeleton of lime phosphates. The sugar after passing through the cylinders is found to have been bleached white, all the coloring matter having been retained by the carbon of the bone black.

In the effort to make it possible for the southern United States sugar planter to do his own refining, under his own sugar house roof, experimenters have tried out a great number of vegetable substances, endeavoring to char them into the carbon state and at the same time give them the necessary mineral back-bone, analogous to the phosphates of the bone black.

As a final result of such experimentation such a carboniferous substance has been presented to several of the state experiment stations, were thoroughly tested, and have been found eminently satisfactory. It had as its striking note a high content of silica, and it was found to decolorize the sugar more rapidly and more powerfully than did the bone black with its lime basis.

This silicious character suggested strongly that rice hulls would serve the same purpose,

since they, too, consist largely of silica. They were tried and have been found so satisfactory that the discovery has been submitted to the United States Department of Agriculture, in Washington, with the understanding that the state chemists are willing to have their remarkable discovery made public property and available for use everywhere.

Heretofore the very decolorizing properties of the rice hulls have prevented their use as feed for cattle, so that they have been an absolute waste. The interesting proposition of using them as a sugar bleach will at once eliminate this waste and relieve the sugar planter of a heavy item of expense.

The method of preparation is simplicity itself. The leaves and hulls are separated from the straw, charred, and boiled in a five to ten per cent solution of caustic soda, and that is all there is to it.

USE OF LIME IN AGRICULTURE.

From a United States Department of Agriculture summary of recent experiments in the use of lime in farming processes, conducted at a number of experiment stations, the following facts may be selected as noteworthy: At one station during a long series of years it was found that the use of burnt lime gave no crop increase, while pulverized limestone showed a crop-producing value of \$1.20 per ton of limestone used. No evidence was found that caustic lime causes the loss of soil nitrogen by the destruction of organic matter to any serious extent.

Another station has, during the past twenty years, conducted experiments on the effects of lime on 280 different varieties of flowers, trees, small fruits, grasses, clovers and miscellaneous crops.

Lime is used to neutralize excess acid in the soil, as well as to increase the available calcium plant food. These experiments show that the difference in the residual effect on soil acidity of sulphate of ammonia

and nitrate of soda is quite marked. Among the plants found most sensitive to soil acidity are asparagus, barley, beets, celery, leek, lettuce, onions, clover, spinach and tobacco.

At another station the lime requirements of the soil were found to amount to from $3\frac{1}{2}$ to 5 tons per acre. After the acidity of the soil has been neutralized, the addition of a ton or two of limestone per acre every five years appears to be sufficient, according to the experiments.

FIGHTING THE PINK BOLL WORM.

In addition to its warfare on the cotton boll weevil, whose destructive operations cost the United States over \$60,000,000 annual damage to its cotton crops, the country is waging a hard fight against the imported pink boll worm. The following interesting process for the destruction of the pink boll worm and other insect pests in the great Bush Terminal in New York City. Similar plants are also installed in Boston, San Francisco and New Orleans.

The cotton fumigation equipment at the Bush Terminal consists of a large fumigating chamber built of stout steel and provided with electrically-operated gas-tight-fitting doors at either end; a gas generator, and an electrically-driven vacuum pump. Tracks lead from platforms at either end of the fumigating chamber, right into the chamber, and two long cars are placed on these tracks for the handling of the cotton bales. In practice, one car loaded with cotton is pushed into the tank and left under treatment for the prescribed one hour and forty-five minutes, after which the other car, which has meanwhile been loaded, is pushed into the fumigating chamber from the other side. In this manner the equipment is never idle awaiting the loading and unloading of the cars.

After the cotton in its packed form has been placed on one of the flat cars and wheeled into the chamber, the two short

lengths of connecting rails are removed and the huge steel door is electrically lowered into place, so as to seal the chamber. The air is now exhausted until the gage registers 25 inches. At this stage the gas is generated by introducing into the generator the following in the order named: Water, diluted sulphuric acid and cyanide in solution. The valve separating the generator and fumigation chamber is then opened either before or as soon as the cyanide solution begins to flow into the generator. The cyanide solution is then run in at such a rate that it will require from 8 to 10 minutes for all of the solution to be introduced. At the expiration of fifteen minutes air is permitted to pass through the generator for five minutes, to wash out all of the gas in the generator, and then the valve separating the fumigation chamber from the generator is closed. At this stage the air valve on the fumigation chamber is opened and the air allowed to rush in until the gage on the fumigation chamber falls to five inches. The bales are held in the presence of the gas and air for one hour and twenty-five minutes additional completing the required exposure of one hour and forty-five minutes.

At the completion of the exposure, to remove the mixture of gas and air from the cotton, the fumigation chamber is pumped to a vacuum of 25 inches, and on reaching this vacuum the valves of the chamber are opened. As the air enters the pump is kept running a sufficient length of time to remove an amount of air twice the volume of the chamber. The pump is then temporarily stopped, until the doors are opened, and then started again and kept running while the fumigated bales are being removed.

After the desired end gate has been raised, the workmen replace the two short lengths of connecting rail, and the flat car is rolled out. Meanwhile, the gate at the other end is raised and the other flat car, loaded with a new lot of cotton for treatment, is wheeled into the chamber.

The men, and particularly the one who lays the connecting rails in place, usually wear respirators which contain a sponge moistened with a one per cent solution of sodium hydroxide, as a protection against the poisonous hydrocyanic acid gas. Other precautions, such as blowers, are resorted to, and certain antidotes are always near at hand for emergencies.

REDUCING AMERICA'S FIRE LOSSES.

Apart from the thousands of lives destroyed by fire, the United States sustains an annual loss from this cause of nearly \$300,000,000—a per capita loss nearly ten times as great as that found in the leading countries of Europe.

In the great public movement to reduce this loss, led by the National Fire Protective Association, the United States Bureau of Standards is being most usefully employed in the determination of fundamental engineering data, to serve as a basis for the revision of state and municipal building codes. It is now proposed by the bureau to continue the fire tests already begun on structural steel building columns, fire-proofed in different ways, and of reinforced concrete columns of different aggregates and types of construction. Tests of floors, roofs, fire-resisting doors, shutters, windows, etc., will eventually be included in the program in order to supply American engineers with the data necessary for re-drafting the present codes. The bureau is now having built a "fire hut" 50+25 feet, for special experiments on the standardization of fire tests. This would provide means for observing the temperatures attained in characteristic types of fires in such a structure when furnished, for example, as an office, a furniture storage warehouse, a unit of a department store, etc.

ALFRED T. MARKS.

NOTES.

The Madras Fisheries Department has for some time been running a factory for canning sardines and other fish at Beypore in Malabar. The factory has hitherto been under the direct charge of a lowpaid subordinate officer whose operations were supervised and directed by Sir Frederick Nicholson. Sir Frederick Nicholson's other duties did not permit him to give to the officer in charge of the factory as much supervision and advice as was necessary, and in 1918 he drew attention to the fact that the appointment of an expert manager was advisable. Mr. Hornell, the Director of Fisheries, who inspected the factory this year before taking charge of it from Sir Frederick Nicholson, agreed in considering the appointment of a well-paid whole time business manager necessary. He pointed out that the tannery has now passed the experimental stage and that the comparatively slow progress made in recent years had been largely due to the lack of a capable wholtime business manager continuously on the spot. He, therefore, suggested that Government should either sell the Beypore factory or develop it to its fullest capacity by the appointment of an energetic business manager on a good salary with a substantial interest in the profits of the factory. Government decided that the Beypore cannery should not be sold at present, drew the attention of the Director to the desirability of using it for training expert artisans and managers who might be available for employment in other factories hereafter to be established by private firms and requested him to submit, in consultation with Sir Frederick Nicholson, detailed proposals for the further development of the Beypore cannery. The Director has since reported that the first need of the cannery is the appointment of an energetic manager with some business experience and an interest in

the profits of the cannery. The expert knowledge required for the cannery business is said to be small, and the Director of Fisheries expects to be able to spare time to impart the necessary technical knowledge to the manager. Sir Frederick Nicholson is in general agreement with this view. There is, however, some doubt as to the suitability of Beypore as a location for the cannery. The Government have now been pleased to appoint Mr. H. L. Prager, Inspector, Second grade, in the Salt and Abkari Department, for a period of two years to manage the cannery at Beypore. Mr. Prager will be paid a salary of Rs. 70 per mensem. He will also receive as a bonus a percentage hereafter to be fixed by the Government of the profits earned yearly over and above the average profits of the two years ending with 30th June, 1919. The accounts of the cannery will be audited annually by a firm of chartered accountants. The question of transferring the cannery to a more favourable locality will be considered after the results of the new arrangements have been watched. The Director of Fisheries has also been requested to submit a detailed scheme for the admission of apprentices for practical instruction in cannery methods and for the opening of small experimental canneries at selected centres in the Presidency.

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The Season and Crop Report of the Madras Presidency for the Agricultural year 1918-19 has been published and can be obtained from the Office of the Superintendent, Government Press, Mount Road, Madras, for a price of 12 annas. This report contains very interesting statistics. The first statement shows for each district the rainfall for the year and the average rainfall. The next statement shows for each district the area cultivated, the area under forests, the area not available for cultivation, the area of culturable waste and the area left fallow. It also gives particulars of the area and the crops irrigated. The next statement com-

pares for each district the area cultivated in a normal year with the area cultivated in 1918-19. The third statement shows for each district by what percentage the outturn of each crop exceeded or fell short of the normal. The fourth statement shows in tons the estimated yield of the more important crops in each district. This estimated yield is compared with the estimate for the previous year and with the normal year. The fifth statement shows the harvest prices of the principal food grains in the different districts and compares these prices with the prices obtaining in the previous year and with the normal prices. The sixth and last statement shows the number of the cattle ploughs and carts in each district according to the Census made in 1914-15. In the ryotwari tracts of the Presidency, Cultivation accounts are maintained for each field by the village Karnam and are checked by supervising officers. A fairly high standard of accuracy can, therefore, be claimed for the figures given for the area cultivated with different crops and for the area irrigated. The estimates of total outturn are, of course, less trustworthy as the difficulty of estimating the outturn is great; special attention has, however, been paid to the point in the last few years, the estimates are undoubtedly more reliable than they were, and it is hoped that every year will see a nearer approach to accuracy. The cattle census is very difficult to take and too much reliance should not be placed on the figures. But the report as a whole is likely to be of use to all students of the economic condition of the country and to the merchant community.

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In the course of their review of the progress report of Forest Administration in the Punjab for the year ending 30th of June, 1919, the local Government state:—At the Jallo Factory, 28,778 maunds of resin were distilled compared with 16,426 in the previous year. Excluding 2,632 maunds distilled for the United Provinces, the yield of

rosin was 18,734 maunds and of turpentine 52,701 gallons. The average sale price of rosin was Rs. 17-8-3 per maund compared with Rs. 16-3-4 in 1917-18. The system now adopted for the marketing of Jallo Factory rosin and turpentine, which has taken some time to perfect, consists in the fortnightly fixing of prices on information received from agents at the chief ports, the basis of the price being the import rates of American rosin and turpentine, which are undersold. This system, in which the United Provinces' factory co-operates, has worked so far without a hitch. A geographical distribution of sale areas, including within its scope the export trade, between the Jallow Distillery and the Bhowali Distillery of the United Provinces, has also been introduced, and an agreement exists between the two factories under which each can borrow the products of the other in case of need. This organization of sales is realizing excellent results, and there is reason to believe that the home product is rapidly supplanting American imports. Attention is also being paid to the standardization of rosin and turpentine while research has opened new prospects for the production of rosin oil, a commodity for which a considerable commercial demand is reported to be probable. The net profits of the resin industry rose from Rs. 2,11,562 to Rs. 2,41,177 and the rate of interest earned on the invested capital from 210 per cent to 232 per cent. These are remarkable results from an enterprise which was restarted on modern lines as recently as 1915. A second Ropar's unit has now been ordered for the Jollo Factory and the prospects not only of supplying the Indian demand but also of building up a sound export business in the future are exceedingly bright.

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The following particulars relative to hydro-electric developments in Japan, furnished by His Majesty's Commercial Secretary at Yokohama, are published in the *Board of Trade Journal*:—The newly-formed Japan

Hydro-Electric Company, which has a capital of yen 50,000,000, proposes to work the most profitable of the water-power rights furnished to it and hitherto held by three companies in certain prefectures and other districts. The new company proposes to generate 1,05,000 kilowatts, and the work is to be completed in the course of two full years. Local demands will be met with part of the power developed, and the rest of the power will be transmitted to another district. The two electric light companies of Osaka and Kyoto have agreed to take all the electric power required by them to meet the demand of the extensive districts over which they operate, so that there will be no difficulty whatever about the disposal of the electric power generated. Eventually it is believed that the company will be in a position to dispose of electric power up to at least 300,000 kilowatts easily and profitably. Another company, amalgamated with the new company on its formation, possesses a hydro-electric power-house capable of generating 7,200 kilowatts and carries on the manufacture of sulphate of ammonia. The latter promises to be a highly profitable business. The present scheme aims at supplying local industries with abundant motive power cheaply, and also at establishing a connection between the business of companies having common interests. It is interesting to note that coal costs fully five times in Japan as much as it did before the war; and that in consequence the cost of the production of electric power by steam has also been multiplied by five or even more.

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The Report of H. M. Senior Trade Commissioner (Mr. Thomas M. Ainscough, O. B. E.) on the "Conditions and Prospects of British Trade in India at the close of the War" (Cmd. 442, price 2s.), has just been issued. The Report is divided into five sections. Part I is a general survey of the present trade position and a study of the

most important factors which have contributed to it. An account is given of the effects of the elimination of the Central Powers, the entry of American and Japanese competition, the development of indigenous industries, and the considerable rise in exchange, all of which are direct results of the war. Part II is a detailed examination of the leading import trades, with special reference to changes in the character, volume, and origin of the imports during the years of war. Part III includes a review of the methods of representation and distribution in India and also definite recommendations as to the revised measures which might, with advantage, be adopted by British interests in order to meet the new conditions. Part IV treats of the development of Indian industries and its significance, with special reference, firstly, to the opportunities for the employment of British capital and industrial management in the country, and, secondly, to the re-adjustments which will probably be necessary in some of our export trades as a result of the competition of local industries. Part V consists of an account of the prospects for the sale of Canadian produce and manufactures in India. A map accompanies the Report, showing the Indian railway systems and the industrial and distributing centres.

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The Industries Section of the U. P. Board of Industries met at Cawnpore on the 25th November, 1919. Certain applications from firms for loans from Government were considered. In regard to those the Board hold that Government should ordinarily make loans only in the case of pioneers, and even then, only if the applicant had tried but failed to obtain the loan from other sources. It accordingly refused these applications but desired the Director of Industries to assist the applicants so far as possible in securing loans from a bank. A proposal to establish a tanning school was examined but it was decided that though the establishment of such a school was desirable the present proposal required

modification. A proposal to purchase a silk finishing plant for the Central Weaving Institute at Benares then came before the Board but was not approved. Finally communications from Government dealing with various subjects were read and recorded. Of these the most important were:—1. A Government Order intimating that the recruitment of a Glass expert had been approved for inclusion in the schedule of new expenditure of the year 1920-1921. 2. A Government Order sanctioning the appointment of Dr. E. R. Watson as Principal of the proposed Research Institute at Cawnpore, subject to confirmation by the Government of India. 3. A Government Order sanctioning rules framed by the Board regarding the award of scholarships for apprentices who desire to be trained at oil mills in India.

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The State of Patiala in the Punjab appears to have made speedy progress both as regards revenue and industrial development of recent years. From nearly 82 lakhs in 1912 the gross revenue of the State has gone up to over and 17 lakhs, and its ruler the Maharaja, who but recently returned to India after strenuous and praiseworthy work at the Peace Conference, has under consideration industrial, commercial and agricultural programmes. A State bank was opened last year and is now doing useful work. A hydro-electric scheme for the State, which was referred to the Punjab Government in April last, has since been considerably expended. Under this scheme it is intended to harness the Sutlej river some 16 miles above the proposed dam at Bhakara and by constructing a series of falls to generate electricity which, it is estimated, will give 1,35,000 horse-power. This power will be transmitted all over Patiala and used for lift irrigation by means of tube well to irrigate an additional area of about 6½ lakhs of acres as also for supplying motor power to various existing and contemplated industries. The climate and soil of Patiala are particularly

conducive to the development of different kinds of industries, and an industrial survey is being carried on with a view to tap and develop its forest and mineral resources. The development of agriculture and urban co-operative credit societies is receiving special attention, and a big railway programme is also under consideration.

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The impetus given to the Canadian chemical industry, due to exceptional demands during the war, is shown in a report issued by the Dominion Bureau of Statistics. This report contains a directory of Canadian chemical industries, with names, addresses, and products of firms whose products are either chemicals or are the result of processes involving chemical change. The number of plants operated is given as 634, 161 of which are situated in the Province of Quebec. The out-standnig progress made during the war was probably the construction of the world's largest glacial acetic acid plant at Shawinigan, Quebec. An entirely new process beginning with acetylene was developed, while acetone, paraldehyde, crotonaldehyde, mercuric oxide, and manganese acetate are now also produced, and magnesium of purity ranging from 99 per cent to 99.9 per cent is made electrolytically from its fusel salts. The following figures show the increase in valve of exports of Canadian drugs, dyes, and chemicals during the fiscal years 31st March, 1912-1919:—1912, 1,677,216 dols.; 1913, 1,800,437 dols; 1914, 1,730,203 dols; 1915, 3,543,701 dols; 1916, 6,449,145 dols; 1917, 9,218,415 dols; 1918, 14,207,609 dols; 1919, 17,053,074 dols, The imports for consumption of drugs, dyes, and chemicals into Canada in the last fiscal year amounted to 32,783,704 dols., of which 23,785,191 dols., represents the value of chemical products imported from foreign countries, and 4,003,513 dols. the value of such products imported from British markets.

The important question of the future of wheat production, with special reference to the Empire, is dealt with at length in the current number of the *Bulletin of the Imperial Institute*. The annual production of wheat in the world prior to the war amounted to about 110,000,000 tons, the largest producers being the Russian Empire, with an output of 22,000,000 tons and the United States, which provided nearly 19,000,000 tons. During the war the production in Europe as a whole, and in Russia in particular, decreased considerably, but outside Europe there was a great expansion. The acreage under wheat in Canada, the United States, Argentina, India and Australia in 1918 was over 25 per cent larger than the average acreage for the five years before the war and it is considered that, at the present time, there is a sufficiency of wheat, even without the help of Russia, to meet the requirements of he world. As regards the future also there is reason for optimism. There are vast areas of land suitable for wheat growing yet to be opened up in Canada, Australia, South America, Siberia and other countries, whilst the present low average yield of 13 bushels per acre is susceptible of great improvement. In recent years the increase in the world's production has been due, to a great extent, to an increased yield per acre, and there is every reason to believe that with the introduction of improved drought and rust-resistant varieties the rise will be even more rapid in the future.

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The *Board of Trade Journal* (November 20th) reviews the conclusions arrived at by a special committee, after touring the Dominion to ascertain the immediate possibilities of New Zealand's secondary industries. The Committee propose the establishment of a Board of Industries and Commerce and a Board of Science and Industry. The former, consisting of three members of wide business experience, would be empowered *inter alia* to engage in trade, investigate and control

prices, prevent exploitation of the public and suppress profiteering, make advances to industrial and commercial concerns, and prevent unfair methods of competition. The Board would also be charged with the duty of investigating such matters as the encouragement, improvement, and extension of New Zealand industries and manufactures; markets outside the Dominion and the opening up of external trade generally; wages and social and industrial conditions; labour, employment, and unemployment. One of the chief functions of the other Board would be the consideration of all proposals for specific scientific researches. It would be able to create scholarships and to award bonuses and prizes "with the object of encouraging scientific and industrial research." Apparently New Zealand is the only Oversea dominion in which an organization for research has not been provided since August, 1914.

A meeting of the International Federation of Cotton Spinners and Manufacturers was held in Paris early in September. It was decided to continue to collect and distribute international statistics relative to cotton and its consumption. In view of the World Conference, which is to take place in New Orleans next week, the International Federation decided to be officially represented, and Sir Herbert Dixon (the President), Signor Nylinio (Treasurer), and Mr. Pearse (Secretary) were designated to take part in the Conference. Interesting reports were communicated by representatives of the different countries relative to the effects brought about by the new hours of work on the position of the cotton industry. A resolution on the necessity for the extension of cotton-growing regions was adopted. The International Committee also adopted the essential recommendations contained in the recently published report of the Indian Cotton Commission. The Secretary was instructed to take immediate measures for

distributing to affiliated organizations a report on Indian Cotton, the report being a résumé of investigations carried out in India before the war on the question of the cultivation of cotton. It is probable that the next International Congress will take place in Switzerland in the summer of 1920.

The administration report of the Mysore State for the past year contains an interesting record of the financial results of the Cauvery Power Scheme. The total quantity of power generated at Sivasamudram during the year was 10,25,30,000 units as against 9,10,87,900 units in the previous year. Of the power generated 88,89,54,080 units were supplied to mining companies in Kolar Gold Field, 99,66,520 units to Bangalore and 36,09,400 units to Mysore City. As regards financial results, the aggregate outlay on the Cauvery Power Scheme up to the end of the year was Rs. 1,20,49,811. Gross earnings from the scheme amounted to Rs. 3,25,22,513 of which the sum of Rs. 10,56,323 represented interest charged at four per cent on the depreciation fund deposited with the government deducting from these gross earnings a sum of Rs. 1,63,50,913 of which Rs. 1,06,16,178 represented working expenses including depreciation fund set apart and Rs. 57,34,735, the interest at four per cent on capital outlay the net profit realised from the scheme for the past 17 years was Rs. 1,61,71,600, or an average of Rs. 9,51,270 per year. Deducting again from the net profit Rs. 11,45,360 the share of the revenue transferred to the Krishnarajasagara works from the 16th July, 1916, net surplus was Rs. 1,50,26,240.

The fifth National Exposition of Chemical Industries was held at Chicago in the last week of September. The exhibition, which brought together about four hundred distinct exhibitors, attracted considerable interest to the chemical trade in general, and to other allied industries, both in this country

and in Canada, and brought together a very large attendance during the week. Foremost amongst the exhibits, both in interest and number, were those devoted to the chemical and dye industry. Another interesting exhibit was that of certain optical glass companies. In addition to this there were numerous exhibits of laboratory supplies, machinery parts and new commercial products produced from chemicals. An array of exhibits of chemicals for all purposes from different chemical manufacturing concerns were much in evidence. A Canadian electro-products company received a great deal of attention. The Department of Mines of the Dominion of Canada were also represented, with an agent on hand to furnish information regarding the mineral resources of the Dominion. The Ontario Bureau of Mines of Toronto, Canada, had a similar exhibit offering the same facilities.

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According to the Silk Association of America, scarcity of labour is the most serious condition which the silk manufacturer in the United States has to consider. Immigration has been the chief source of supply of this kind of labour, but there has been no immigration since the war, and many foreigners are returning to their native lands, having saved enough from their "inflated war earnings" to enable them to establish themselves in comfort in their own countries. This condition also causes a shortage in semi-skilled and manual labour, where wages are triple those earned in former years. Silk operatives who became munition workers have attained a certain degree of knowledge and skill in the metal trades, and many are remaining in those industries. Female labour has grown "alarmingly scarce." With wages advanced in all industries, the wives and daughters of families do not find it as necessary to seek work, and the children are being kept at school longer. It would be interesting to know if, for similar reasons, children of the

more highly-paid workers in this country are being kept at school longer.

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The Director of Agriculture, Madras, reports as follows:—The area sown with paddy in the Madras Presidency up to the end of November, 1919, is estimated at 10,522,000 acres. In the previous year the area was only 8,347,000 acres. Thus there is an increase in area of 26 per cent for the whole of the Presidency. In every district, except Guntur, there is a greater or less increase in the area under this crop this year. This is due largely to the favourable season. Further the ryots have this year grown paddy on many lands under small tanks where cotton and groundnut had been cultivated in the previous years. It is gratifying also to learn that the average yield per acre will be above the average. It is at present estimated as being 9 per cent above the average crop. There was a certain amount of damage from heavy rains just before harvest in the deltas and the Circars. This may somewhat reduce the average yield. But in Ganjam, Kurnool, Nellore, Coimbatore, Trichinopoly and Tanjore the crops are reported to be considerably better than the average, while on the West Coast the crop is reported to be absolutely bumper.

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A Bombay Government resolution reviewing the work of the Registrar of Co-operative Societies for the year 1918, points out that the failure of the monsoon in 1918 severely tried the resisting capacity of agriculturists, who form the bulk of the members of the co-operative societies. The working of these societies shows that agricultural co-operation has achieved a high degree of protection against the vicissitudes of the season, and lends further support to the views of the government, formed as a result of the famine relief operations, that the people of the Bombay Presidency have developed staying power of unexpected strength, which was evidenced in the loyalty of depositors to their

societies as indicated by the comparatively small amount of withdrawals. In Bombay there is one agricultural society for 12,293 of the population and the average membership is 71 per society, while Madras and the Punjab have only 59 and 32 respectively. The average capital per society is also greatest in Bombay. Amongst the millhands of Bombay good work is being done mainly through the agency of the Debt Redemption Committee and Social Service League.

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Mr. W. A. Appleton, in his report on the Washington Labour Conference, says:—"I found some delegates who believed that the nations would officially accept the findings, but none outside the Conference who believed that international uniformity could result. Racial characteristics, climatic conditions and physiographic opportunities differ too widely for uniformity in hours, wages and methods to be possible. What may result is an arrangement by which the exhaustive effects of work may be ascertained and the real value of work determined. Generally it was agreed that humanity demanded the abolition of conditions which destroy health and happiness, but that the world is so short of necessities that it cannot continue the support of the idle. Each nation, the Conference thinks, may be expected to guard zealously its right to work out its own salvation in accordance with its national circumstances and opportunities. Attempts to infringe this right may provoke international quarries of far greater seriousness than those which arise from our own demarcation squabbles.

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The Madras Government is interesting itself in the development of fruit culture on the Nilgiris. The other day it accepted certain proposals for the establishment of a jam and pickle factory at the well-known hill station on the Nilgiris, Coonoor. By an order it has just passed that beautiful property, the government gardens and parks have

been transferred to the Agricultural Department, the Curator being absorbed in the cadre of the department. It is proposed to entrust him with the work of studying the possibilities of fruit culture, and, in addition to improve the cultivation of the potato, of which there is an excellent variety grown on the Niligiri hills. The Madras Government has a most creditable record of useful enterprise in several directions. Thus, many years ago, it successfully pioneered the aluminium and the chrome tanning industries; and later, as has more than once been pointed out under the able guidance of Sir F. A. Nicholson, it organized the fishery industry, one of the most successful State enterprises in India.

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Two new sugar companies have been established in Formosa, both of which will carry on their operations in Shinchiku Prefecture. Hitherto sugar-cane has not been very extensively planted in this district, as it is rather far to the north, and the climate is not so well suited to the cultivation of the cane as that of the south. The present prosperity in the sugar market is, however, causing fresh land to be developed, and it is thought that the extreme fertility of the soil in the Shinchiku district may counterbalance climatic disadvantages. The Asahi Seito Kabushiki Kaisha (Asahi Sugar Manufacturing Company, Ltd.) has been established with a capital of yen 3,500,000, divided into 70,000 shares of yen 50 each. The promoters will retain 64,000 shares for themselves, the remaining 6,000 being offered at a premium for public subscription. The well-known Suzuki firm of Kobe are the moving spirits in this enterprise, the new company taking over the firm's interest in the district with a view to the erection of a modern sugar mill and the extension of operations.

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According to the "Osaka Mainichi," orders from Japan for British or American machinery are very large at present. The demand

is said to be concentrated on machinery pertaining to electricity, electric light and electric trams, steam boilers and spinning machinery. As regards the increase in the demand for electrical machinery, it is due to the development of communications and industry and also to the large increase in the price of coal. On the other hand, many capitalists who intended to import machinery for the enlargement of their business during the war, but hesitated on account of the enormous rise in the price of iron, have now made up their mind to import, as they have realized that prices will not decrease for some time to come, in view of the present labour and other difficulties prevailing in Europe. This attitude on their part has naturally increased the orders for foreign machinery, which have already amounted to large figures.

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A Press *communiqué*, says:—It is published for general information that it is proposed to hold a British Empire Exhibition in London in the summer of 1921. The primary object of the Exhibition is to promote the extension of Imperial trade by bringing before buyers from all parts of the world exhibits of the industries, inventions, raw materials and products of the Empire. The British Board of Trade has expressed approval of the proposal, and although the Government of India do not propose to participate officially in obtaining representative exhibits of all products, industries and raw materials of India, they desire to commend the Exhibition to the general public and manufacturing firms, and hope to arrange for a display of Indian timber. All requests for information should be addressed to the Director, British Empire Exhibition, 25, Ironmonger Lane, London, E.C.

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It is notified for general information that the Government of India have prohibited the export of Russian rouble notes to all destinations from and after the 17th January, 1920,

except in the case of rouble notes deposited in a Government Treasury under the terms of the Rouble Note Ordinance of 1919 which may be withdrawn for export under a licence issued by a District Magistrate or Commissioner of Police. Any person obtaining a licence to withdraw notes already deposited by him in a Currency Office or Government Treasury will be permitted to retain them with a view to export for a period not exceeding ten days. In order to export them he should present his licence with the notes for export either to the Customs Officer or to the Post Office according to the means of export which he desires to use.

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Sheep farming continues to make but slow progress in Japan. Notwithstanding measures to secure home-grown wool, and the establishment of a scheme which was planned to be fully matured in a little more than ten years' time the number of sheep in Japan had increased from about 3,500 at the end of 1917, to only 6,000 at the close of the first half of 1919. As one aim is to increase sheep rearing to 1,000,000 head in twenty years, after which further efforts are to be made until the number reaches 7,000,000 it will be realised that very little has as yet been done towards rendering Japan self-supporting in the matter of wool supply.

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The Government Entomologist of the Agricultural College, Coimbatore, notifies that he is in a position to supply Fish Oil Rosin Soap at the rate of Rs. 0-2-1 per lb. This should be used to spray mango trees to save them from the mango hopper disease. A pamphlet containing instructions showing how the soap should be applied will be sent free of charge to any tree owner who applies to the Government Entomologist, Agricultural College, Coimbatore. The tree owners living in Northern Circars can obtain the soap and the pamphlet by applying to the Deputy Director of Agriculture, No. 1 Circle, Anakapalle.

The 7th Meeting of the Board of Industries (Education Section) was held at Cawnpore on 26th November, 1919. Amongst the matters disposed of were applications for increase in the grants in aid to several industrial schools. The proposed curriculum for the carpentry and smithy classes recently started at the Central Weaving Institute, was laid before the Board. Similarly also were proposals for establishing a Machine workers' class at the Government Carpentry School, Allahabad. Estimates for improving the equipment of this school were also framed. The next meeting of this Section of the Board is to take place in Benares, early in January, 1920.

Representatives of an American aluminium concern have recently arrived in Japan, according to the Press, to confer with Japanese aluminium interests in the formation of a company, the proposed capital of which is yen 10,000,000, the Americans to take one-half the shares and the Japanese the other. The parties are in negotiation with the Japanese Government for water-power rights in Toyama Prefecture. The American company, having agreed to transfer to the Japanese all its manufacturing rights and technical experience, do not wish that the shares to be offered in Japan should be open to public subscription.

H. M. Commercial Secretary at Yokohama writes that official plans are being prepared by the Japanese Government for the establishment of Commercial Commissioners in foreign cities to forward Japanese trading interests. While the Department of Agriculture and Commerce has been able, in the past, to obtain commercial reports from Japanese Consular officials such reports it is stated have proved of little use for practical purposes. It is, therefore, deemed advisable to establish offices of Japanese traders in order to expand the country's commercial power throughout the world.

The Minister of the Interior of the Canadian Government has made an arrangement between the Hydro-Electric Power Commission of Ontario and the Water

Power Branch of his own Department for the purpose of a thorough water recourse and power investigation of the Province of Ontario. This joint agreement has been given effect by Order-in-Council, and the investigation will be carried out under the supervision of the Director of Water Power of the Department of the interior. A skilled hydrometric survey staff will be organized and put to work without delay.

A company has been promoted in Yokohama with a capital of yen 2,000,000 for the purpose of manufacturing pulp from seaweed, called "ajimo," and to manufacture paper of all descriptions. In view of the abundance of suppliers everywhere and also of the fact that pulp made from seaweed requires a comparatively small quantity of chemicals for the manufacture of paper, the promoters of the company are most optimistic about the success of the undertaking. Almost all of the shares of the company have been taken up by the chief promoters.

We acknowledge, with thanks, the receipt of an excellent likeness of H. R. H. the Prince of Wales from the *New York World*. We understand that it was issued as a supplement on fine paper by our well-known contemporary as a souvenir of H. R. H.'s visit to the States. Six-hundred and twenty-five thousand copies were, we are told, printed and distributed. We congratulate our contemporary on its public spirit and enterprize. The artistic merits of the likeness deserve commendation.

The Colonial Report for 1918 (No. 1007) states that some beds of monazite sand have been discovered in Ceylon, and a special plant for the treatment of a bed of this sand near Bentota was erected during 1918. The plant has worked successfully, and by the end of the year some 20 tons of refined sand had been separated, and will be shipped to England when an opportunity occurs.

We publish in this issue Dr. Murry Stuart's report on the possibility of smelting electrically the Kanjamalai iron ores, situate in the Salem district of the Madras Presidency. We have no doubt the Report will be read with interest in view of what is being attempted on these same lines in the State.

GLEANINGS.

An interesting but rather curious method of cultivation for the production of large (papai) fruits is sometimes practised, says an exchange, in Malaya. When the plant is three inches in diameter at the base, a hole is bored in the trunk, about six inches from the ground. The hole is made about an inch deep and sufficiently large for a piece of rubber tubing to be inserted. A quart bottle is half filled with sugar, and water added. When the sugar is thoroughly dissolved the bottle is connected to the hole by a piece of rubber tubing. In twenty-four hours the tree will have absorbed the contents of the bottle. A gunny sack is wrapped over the lower fruit and trunk to hasten the ripening of the fruit. It is stated that, if these directions are carried out, fruits averaging ten to twelve inches in diameter will be produced. During the fruiting stage, several of the smaller fruit should be removed, to allow the remainder proper development.

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The control of electrical machinery by the sound of a whistle at any distance up to a mile was recently demonstrated to a *Sunday Express* representative. By the blowing of a whistle a small motor-car was started, directed to the right or left, and stopped by repeated sounds. The model was fitted with the essential batteries, and no wires or wireless apparatus are claimed to have been used. Vibration alone is responsible, and the same results are claimed to have been accomplished by means of inaudible vibrations. The inventor, Captain A. J. Roberts, an Australian flight captain, is said to have produced other inventions connected with wireless in the air and the controlling of torpedoes by the same means.

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With a view to check the practice of adulterating castor oil before export, it has

been suggested that the Government should provide facilities for the examination of the oil and the issue of official certificates of purity. The Government have considered the suggestion and have decided to allow the Chemical Examiner to test free of fee such oil as is sent to him by firms and individuals approved by the Director of Industries and to grant in each case a certificate showing the standard of purity attained. The scheme is entirely an experimental one and will come into force from the 15th January, 1920.

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The *Agricultural News* says:—"Experiments conducted in France begun in 1911 in order to find out if there is any truth in the popular supposition that the moon exercises an influence on the growth of plants. In the latest trials, planting at the time of the new moon gave the greatest yield in twenty-eight cases, planting in the first quarter in twenty-nine, planting at the time of the full moon in twenty-eight, and planting in the last quarter in twenty-seven. This shows that no material difference in yield could be attributed to the influence of the moon."

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The following telegram was received on 3rd January from the Secretary of State, Fiji. Following telegram from Governor, Fiji, received at Colonial Office:—"January 2nd. On unanimous advice of Executive Council and with concurrence of Council of planters and majority of elected members I have issued order cancelling all indentures of East Indian labourers from this day. Please inform Government of India. Rodwell."

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It is stated in the American Press that two blast furnaces are to be sent from the United States to the Tata Iron and Steel Company at Jamshedpur. A charcoal blast furnace is also being made for the State of Mysore, and a contract has been accepted to supply a 350-ton blast furnace for the Indian Iron and

Steel Company. The latter company proposes to erect three blast furnaces, by-products coke ovens, benzol plants, etc.

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In the ordinary process of silvering glass mirrors by chemical decomposition the metal is deposited upon the glass container. In this manner a great deal of silver which might have added to the thickness of the mirror is lost. This is an important item when silvering mirrors 25 cm. or more in diameter. A note appears in *Science* from Mr. W. W. Coblentz, of the Bureau of Standards, calling attention to the usefulness of ordinary "granite-ware" enamelled iron pans, which do not attract the silver, and hence increase the supply of material available for deposition on the mirror. During the past year he has had frequent opportunities to verify this observation and to apply it in producing thick deposits of silver on glass.

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The Travancore Darbar has been of late taking steps to advance industrial development in the State. Some time ago the Director of the Industrial Department of the State recommended opening a pencil factory. A private firm agreed to carry out the scheme if they were given a free site. Government have sanctioned the proposal and provided a site, and has also ordered the supply, on payment, of five to six hundred candies of soft wood by the Forest Department.

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The output of electric energy of the central stations of the United States increased from 2,507,051,000 kilowatt-hours in 1902 to approximately 28,000,000,000 in 1917. According to Mr. H. C. Hoyt, of the General Electric Company, twenty years ago only about two per cent of the total electric energy was supplied by central stations, but to-day about 33 per cent is purchased from them, furnishing 10,000,000 horse-power in electric motors.

A water-power survey is being carried out in Japan in order to investigate the possibilities of hydro-electric power production for industrial power purposes. The survey will extend over five years and will cost 830,657 yen. The total power of the falls to be investigated is estimated at over 5,000,000 h. p.

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A Report issued by the Japanese Cotton Spinner's Union shows that net profits obtained by thirty-five cotton spinning companies in Japan during last year amounted to 109,014,000 yen,—a record since the inauguration of the spinning industry some thirty years ago.

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The water-power possibilities of the Dutch Indies have recently been surveyed. The water-power so far discovered amounts to about 1,000,000 h. p., and it appears that conditions would allow of power stations of 100,000 h. p., being established in certain districts.

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The railless electric traction service of Shanghai, which has now been running for nearly four years, is the only one of its kind in Asia. There are seven cars on the route, and last year they carried some 5½ million passengers.

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At the beginning of 1919, the number of motor vehicles in the U. S. A. was calculated at over 6¼ millions. Since then the output of American manufacturers has increased enormously and the figure quoted is already far out-distanced.

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The war is responsible for the prosperity of the celluloid industry in Japan. In 1914 the output was 525,826 lbs. valued at 522,344 yen. This rose rapidly until it amounted in 1918 to 3,240,454 lbs., valued at 5,190,408 yen.

TOPICS FROM ECONOMIC PERIODICALS.

THE VALUE OF ARTIFICIAL MANURES.

The *South African Sugar Journal* says:—

There are many parts of this country where the old belief that soils can go on yielding for ever without any sort of replenishment of used constituents still keeps the cultivators from making the best use of their farms. Of course it is a fatal error. But notwithstanding that artificial manures have become an indispensable part of modern farming operations, nearly all the important chemical fertilizers are of comparatively recent introduction. True, lime and bones had been recognised early as having a beneficial effect on farm crops, as had several substances not properly plant-foods but, previous to the nineteenth century, the farmer had to rely on the natural product of the soil to provide the necessary elements of fertility. The soil of a country represents an accumulation of wealth which has taken ages to establish, and which is the most precious of all national possessions; it can be exhausted by bad farming until its annual produce is so small as to render it unprofitable, but complete exhaustion is impossible.

Each year natural agencies render available a small quantity of plant-food, and in addition a very limited amount of fertilizing matter is brought down from the atmosphere. This process carried on throughout the ages, without any drain on the soils, results in great accumulations of fertility in virgin soils, but immediately these lands are put under the plough, a loss of the soil fertility takes place, leading eventually to exhaustion unless a means is found of replacing the elements of plant-food removed.

In the four-course rotation, when average crops are produced, 73 lb. of nitrogen, 22 lb. of phosphoric acid, and 61 lb. of potash are removed from the land annually when the whole crop is sold off. Successful crop-production does not depend entirely on plant foods; the mechanical nature of the soil is a factor of prime importance, as also are drainage and cultivation; but exhaustion of the plant-food will render all other influences inoperative.

The introduction of artificial manures was perhaps the most important advance ever made in agriculture, as soil fertility is the basis of all success in farming; farmyard manure contains a very small percentage of plant-food, and, however important, its bulk may

be in the physical improvement of the soil, the amount produced per acre under natural conditions is too small to give maximum crops when returned to the land. Even the most fertile land produces, under natural conditions, too small quantities of manure to maintain its fertility. Without artificial manures many farm crops cannot be produced at all at a profit—a great extension of crops has grown with the use of artificial manure. The value of bones—especially ground bones—was early recognised by farmers, and there existed a very marked prejudice in their favour.

Farmers, as a class, fear the use of any manures which they believe will cause exhaustion. Peruvian guano—the droppings of sea-birds deposited in the rainless districts of Peru—was introduced as a manure in the early forties and, as it contains the three most important elements of plant nutrition, it gained a popularity almost equal to that enjoyed by bone manure. Soon after the introduction of guano the use began of nitrate of soda, sulphate of ammonia and potash salts, and LIEBIG discovered that bones were rendered much quicker in their action when dissolved in sulphuric acid. This discovery suggested to SIR J. LAWES the use of phosphatic rock as a manure and he took out a patent for the dissolving of mineral phosphates in sulphuric acid, the product being superphosphate.

The proper use of artificial manures was at first not understood, and even to-day much ignorance exists among practical men in this matter, leases still being in existence where the use of nitrate of soda is forbidden. Agriculturists throughout the world owe a debt to SIR JOHN B. LAWES, who founded at Rothamsted an experimental station—now world-famous—to investigate the action of chemical manures on crops and the soil, and it is on the knowledge gained from these experiments that the whole science of manuring is based. Experiments of this kind prevented manures of fundamental importance, such as nitrate of soda and sulphate of ammonia, being banned entirely in agriculture, as, until the nature of those manures was understood, they probably did more harm than good, owing to the way they were applied.

As in the case of lime, the effect of quick-acting nitrogenous manures on many crops is so potent that it was quite natural for the former to jump to the conclusion that, to obtain great yields, it was only necessary to apply one or the other of these manures. The effect of applying soluble nitrogenous manures frequently, without at the same time giving mineral manures, is now well known, the plots at Rothamsted, which received dressings of sulphate of ammonia annually, being now practically barren. Thus artificial manures are of comparatively little use to

the farmers without knowledge of how to use them properly. Instead of purchasing chemical manures, many farmers prefer to spend the money on concentrated cattle foods, trusting to the large manurial residues left in the dung to give the required plant-food. This method makes it possible to maintain a larger head of stock on the farm, from which it may be possible to take a profit, and, in addition, often gives better results. Under certain conditions of soil and climate, land can be more effectively improved by feeding the manurial constituent required by crops in the form of concentrated foods to the farm animals, securing enriched farm-yard manure, which on many soils, is particularly effective.

The introduction of basic slag as a manure, placed in the hands of a farmer, is one of the most valuable aids ever bestowed on the industry. Basic slag is a phosphatic manure with a basic character, and owing to this condition, it can be applied to sour pasture land, the results being marvellous, often doubling the stock-carrying capacity of the land. A dressing of from 5 cwt. to 10 cwt. per acre will cause a dense growth of the most nutritious of all pasture plants—white clover—to appear, which nourishes with nitrogen the surrounding herbage. Where the grass is so coarse as to be refused altogether by stock before the application of the manure, the change brought about in the herbage is so great that, as a result of the slag dressing, the land is grazed as close as a tennis lawn.

The effect of artificial manures is well shown in the Rothamsted experiments, which have been carried out over a sufficient number of years to eliminate all seasonal influences. The average yield of hay per acre for upwards of forty years was 23·2 cwt. per acre, without manure, whereas from the plot receiving a dressing of superphosphate and sulphate of ammonia an average yield of 35·5 cwt. of hay was annually obtained, an average increase in yield of 12·3 cwt. per acre. The high yields of wheat obtained in England, Denmark and other highly farmed countries, is largely due to the system of rotation of crops and the large head of stock kept; the Rothamsted experiments, however, show that without the aid of stock heavy crops can be obtained by the use of artificial manures.

THE SMALL INDUSTRIES OF INDIA.

Mr. H. W. Wolff, the great authority on Co-operation, writes in the *Bombay Co-operative Quarterly* :—

There are two distinct tendencies now observable in the co-operative movement in India, which are of great promise for the future well-being of the people. The aim of one is the multiplication of co-operative stores, to supply the people with cheaper and better, certainly more trustworthy articles of consumption, dress, household implements, and other domestic and personal requirements. Experience in Europe shows how marvellously co-operative distribution may benefit and emancipate the humbler classes on a large scale. And prospects in India are distinctly favourable. The matter is there also more important, inasmuch as the number to be benefitted is greater, and fraud and overcharge appear to be more rife. There is now also more provision made for an easy original supply of goods to be dealt in at the store, than there was when the movement began in Europe. I think I may answer for it that, if a distributive movement is vigorously set on foot in India, the English Co-operative Wholesale Society, which is the best and cheapest universal provider for stores in the world, would meet such movement with good will, and do what it legitimately could to further it.

The other tendency referred to is of no less importance and promise. It is for pushing the development of the small industries, which in India appear to be a very necessary and ideal economic stand-by for the vast population, as if marked out specially as such by Providence. There are people ambitious to see large power industry growing up in India. Let it be so! Everything that aids to provide employment and increase production will be a gain to the huge empire. But, whatever be the development of such power manufacturing, it cannot, for a long time to come, cover more than a very small portion of the space to be provided for. Besides, I put it to any one who knows India, whether the Indian appears at all cut out for wholesale monotonous and wearying mill-work, in more or less close and shut up, unhealthy rooms, at a steady grind, away from his house and little field. For it is, of course, of the country population rather than the urban that I am now thinking—as is, presumably any one who busies himself with thinking at all about this subject. The store movement is likely to develop most rapidly and extensively in urban areas. It is the dweller in the country, in his more or less

isolated village, with a field or two to cultivate, who needs small industry, though not probably, as a rule, as a main employment, but as a make-penny supplementary occupation, to fill up time which he would otherwise waste, and earn him some additional rupees. How usefully cottage industries, as they have been called, may act in this way we see in many parts of Europe. I have been through—mostly on foot—the principal areas, in which cottage industries are practised—except in Russia, where there are many thousands of *kustar* artels in which small folk, who also cultivate land, ply their humble trade. And it is gratifying to hear the click-click of the handloom in the smallest cottages, say, on the mountain sides of the Foudai valley, to see in Lorraine women and girls working away eagerly at their embroidery—which is the best paid small industry going—the Black Foresters making their parts of clocks and watches, the Truringian peasants shaping their meerschams, and the maidens and children of Tuscany plaiting their straw. It is all so picturesque! But it also tells of money earned by labour which would otherwise run to waste. However, the classic country for small industry—which in this case includes fishing—appears to be Japan. There small industry and fishing fill up a large space in the country's production and draw much money into the humble homes of poor but industrious people. Here in England, we see the second chapter of that commendable Japanese home industry—in the "Japanese Departments" of our great stores, in which Japanese articles, for the most part produced in cottage homes, are offered to the public in striking variety and sell exceedingly well.

That, I confess, has made my mouth water on behalf of India. India is not far distant from Japan. It has a population very similarly circumstanced. Only the other day, I read in an Indian paper of the growing difficulty existing in India out of the great pulverisation and splitting up of small landed property, which yields to its owners less than even a poor pittance. Why should not the *rayat*, with his minute parcel of land, do as does the Japanese peasant, who ekes out a living, by the side of what his all too small holding will render, by fishing, basket-work or some similar by-occupation? India, no less than Japan, is the land especially of small industries. There are numbers of them. Mr. Ewbank some time ago gave us the number of those who practise them in the Bombay Presidency. Professor Mukherjee counts up a considerable variety of such industries in his book, "The Co-operative Movement in India." Mr. Chatterjee has a long catalogue of them to give in his report on the United provinces. The evidence given before the Indian

Industrial Commission—only just made public in England—is full of references to them.

As regards competition with that more showy power industry, for which, carried away by the gloss of its magnitude and its supposed magnificent profits—often enough now-a-days reduced by strikes, of which small industry knows nothing—certain economists have conceived such preferential admiration, there is no fear whatever that small industry would not be able to hold its own—provided that its devotees select the right class of articles to manufacture. Power industry is indeed increasing rapidly and making a great show of its growth. However, small industry is advancing no less steadily, although with less of *reclame* and blowing of trumpets.

But, on the other hand, it is quite true that small industry has everywhere certain rather formidable adverse conditions to battle with. In the first place, frequently enough, there is a want of technical skill among those who carry it on, often enough with faulty old-world tools, being wedded to old traditional methods of production, which have become out-of-date. I should not, judging at a distance, hold that the monopolisation of certain industries by distinct castes is necessarily a serious hindrance. Continued practice, handed down from generation to generation, in a caste rather suggests useful accumulation of experience and inherited familiarity with the particular work. Every trade has its own peculiar knacks, which must be learnt. But when the familiarity becomes stationary, that indeed tells against good execution. On the other hand, such exclusive practice tends to impress upon the articles made the valuable stamp of characteristic originality, which make them prized. In Germany, where for various reasons small industries are much encouraged and patronised by the authorities, Governments seek systematically to meet this difficulty of backwardness in skill by providing technical schools and demonstrational exhibitions, the outlay upon which from public funds, under the circumstances, appears legitimate, inasmuch as what is in them given is teaching, not a subsidy to business. Something of the sort might be practicable in India.

Another difficulty to be contended with is that of money wherewith to purchase raw materials or tools, or else to store goods or hold them over in times of slumps. For that difficulty it may be hoped that co-operative credit may provide a remedy. Professor Kuwada in Tokyo to whom I wrote, inquiring about the measures understood to have been taken in Japan, as I have more than once been told, to encourage and promote cottage industries, are closely interlinked and interwoven with co-operation, which we know is—more particularly on the credit side—extensively practised in Japan. The two subjects appear there

to have become practically one, and both thrive—which is a promising augury for their interconnection in India. Well, co-operation there is in India, as well as in the Empire of the Rising Sun, and it is doubtless capable of the same good services,

However, the most serious difficulty of all to overcome is that of finding a market for the products turned out. It is a universal experience that persons engaged in cottage industries, when unsupported or unorganized, fall an easy prey to middle-men, who constitute the only means open to them for disposing of their wares, and who fleece them unscrupulously and very effectively. As matters stand now, the dealer has the whiphand of the small manufacturer by reason, in the first place, of his command of ready money, against which the maker of the wares has nothing to pit but an empty pocket. That defect, it may be hoped, as has been said, co-operative credit will remove. However, our *bania* has another powerful advantage over his victim. He knows the market. The maker does not, and could not if he knew it, at all cultivate it. For that would mean much expenditure of time and travelling, such as he is not equal to. Now I am afraid that the practisers of village industries have added to that advantage possessed by their adversary by falling into the same error which we know that our manufacturers in Great Britain have dropped into, namely, that of considering their own facilities for production and their own taste in the product turned out, rather than the tastes and needs of those whom they look to, for buying their goods. It is in this way that we in Great Britain have lost so much business in international trade to our rivals in Germany and the United States, who have been assiduous in studying other people's tastes and adapting their production to them, by which means—even apart from any advantage that they could give their customers in the way of lower prices or longer credit—they have captured the market. The market is the great crux.

Now co-operation may do a great deal to get over this difficulty. Producers organizing themselves as co-operative societies may employ their own salesmen, knowing the market as well as the *bania*—just as our wholesale distributive societies employ their travellers, and as our agricultural co-operative societies employ their own scientists and technical experts. But that is a work of time—and in India, so there is reason to fear, of not a little time and trouble. Emporia for the exhibition and sale of goods, such as Lady Carmichael has public spiritedly created in Calcutta, may do good. In Europe they have not answered over well. But India is the land of bazaars. And, circumstances being different, results may be so too. But probably such exhibitions will mean only advertisement. And, being confined to

goods made under peculiar circumstances, naturally only people interested in those particular circumstances can be expected to visit them, and see, and buy. Now that necessarily means a restricted market, rendered probably more restricted still by the production of articles such as patrons of them will purchase from good will, to find them look pretty, and to show their sympathy, whereas for the numbers engaged a large market is required. An emporium frequented by the general public, as a matter of course, in incomparably larger numbers, might be found more serviceable. Seeing those "Japanese Departments" that I have spoken of in our London Stores, and being advised of their success, it has worried me not a little to think that "Indian Departments"—are conspicuous by their absence why should we not have "Indian Departments" especially at the present time, when British patriotism is so strong among us our public desires to boycott enemy-made goods and buy by preference what is made under the shadow of the Union Jack. I ventured to put the question why India is not favoured like Japan—India being a bit of ourselves, whereas Japan is after all only a highly valued, loyal Ally—to the manager of one of our great London Stores. His reply was that Indian goods are not found to sell. The Japanese manufacture articles of general utility, such as lacquered ware, basketwork, and the like. For such there is always a market. Indians have sent mainly knicknackery—iron, silver and shell ware—and the like, all very artistic to look at and interesting and commanding a certain demand, but by no means a large one. My friend's establishment could not undertake the risk of speculating in such things. However, he made me this proposal. If a consignment of Indian goods, of general utility, were to be delivered to him "on sale or return" he would, as an experiment, make a very good show of the wares by themselves in a distinct department. And then, we should see what the result might be. If the experiment were to succeed, the establishment's own interest would, so I hold, lead it to go on with its "Indian Department." And if it were to do so, other large establishments of the same sort would infallibly, necessarily, have to follow suit. That would mean that many thousands of people, not coming to the stores specially to buy Indian articles, but to purchase just what they might want or fancy, would pass through the Department, being naturally attracted to it, at first by its novelty, and later by the abiding interest, which we English naturally feel in India, as well as by the knowledge that they would find something or other there that they would be glad to buy.

Now, this offer, I should say, ought to be acted upon. It might, if successful, prove a substantial

gain to those small industries upon which for a long time to come, India is likely in part to be dependent, and which, carried on at a sufficient profit, must mean prosperity and happiness to millions of our Indian fellow-subjects and, through them, an accession of wealth to the entire community. The way to execute this will be to find public-spirited people—such as there are in great number, taking an interest in India's welfare, prepared to charge themselves with the risk of the goods not finding purchasers. It will be for people in India to begin. That done, I think we may expect that equally public spirited Anglo-Indians in the United Kingdom will also come forward to join in the venture. In this way, the ground might be tested and possibly a good move might be found to have been made.

However, there is a second condition to observe. The goods sent must be such as a European public would be likely to buy. We could do with a little of that artistic knickknackery which we so much admire and in the making of which Indian craftsman exhibit so much skill. But the bulk of the consignment must consist of articles of general utility, such as Indian carpets, which would probably be sure to sell; for they are greatly appreciated in the United Kingdom. It will be for people in India, interested in the fate of the indigenous workers, to consider whether they can give their help. I venture to hope that, for the good of those workers and of the country, it may be found possible, and that, the attempt having been made, it may, please God, be carried to a successful end.

ECONOMIC NOTES.

AGRICULTURE.

Agricultural Pests.

The Madras Publicity Bureau in one of its recent leaflets says :—

All agriculturists know the damage caused from time to time by the numerous pests which attack paddy : much less is known of the work done by the Agricultural Department in endeavouring to find a remedy for these pests; and it is not surprising that indignant correspondents write from time to time to the papers wanting to know what the Agricultural Department is going to do about it and why no instantaneous remedy is provided. These sufferers can hardly be expected to consider how numerous are the pests that attack the

different crops which the Agricultural Department is required to protect, how short a time has elapsed since these pests first began to be studied scientifically, or how much patience and ingenuity nature requires of her cross examiners before she will give the information which they are anxious to elicit. Human diseases have been studied uninterruptedly by a special class of scientists in Europe at least, for over three hundred years and we know to our cost how little can yet be done to combat some of the most important and deadly diseases. It is hardly fair to expect the Agricultural Department to find a cure for all the ills that beset our South Indian crops in 20 or even 50 years. It is more interesting and more encouraging to inquire what the Agricultural Department is doing than to find fault with it for what it has not done. The following account of a small experimental operation which is being carried out by the department in a tract in the Godavari delta may help to explain something of the methods which the department employs and the difficulties which it encounters.

Two of the commonest paddy pests in the Godavari delta are : the *Spodoptera mauritia* (the paddy swarming caterpillar) and the *Schenobius bipunctifer* (the paddy stem-borer).

The Agricultural Department are now fairly confident and they know a method by which the first pest can be checked, provided that water is available. The method recommended is the timely flooding of the fields with the use, if possible, of a little kerosene-oil. The caterpillars climb to the top of the blades of paddy and can then be knocked off into the kerosined water by dragging a rope over the field. But with regard to the second pest the department is doubtful whether any effective method of combating it has yet been discovered, and it holds that further research and experiment is necessary.

The second pest, the paddy stem-borer, is a small yellow moth which lays a mass of down-covered eggs on the leaf of the paddy plant. From the egg comes out a minute caterpillar which makes its way down to the base of the ear head bearing shoot and bites its way into it. There it stays, grows and feeds till it has reached its full size when it wraps itself in a silk cocoon and awaits its transformation into the moth. The central ear bearing shoot of plant whose stem is thus hollowed out withers and dies. These characteristic withered shoots (Telugu, Usateru; Tamil, Venkatiri) are well known to the ryot who with less than his usual acuteness attributes the withering to an unfavourable wind ignoring the caterpillar which is the real culprit.

At one time the Agricultural officers were inclined to recommend light traps to catch the moth of the paddy worm, but experience has shown that though

many moths were caught in the traps yet the number was not sufficient to make any appreciable difference to the damage done to the crops. The Government Entomologist has hopes that a really effective trap could be designed if we know what it is in the paddy plant which attracts the moth to it. In the United States of America, two organic chemists after much research were able to discover an essential oil which attracted the cotton boll worm to the cotton plant. The experimental stage has not yet been passed, but it seems probable that by means of this oil a high percentage of the boll worm could be dropped and destroyed. But in order to find the attractive principle in paddy it would be necessary to depute an organic chemist to study the paddy plant from this point of view for an indefinite length of time. If this were done, it might be possible sooner or later to discover a substance which would enable us to devise a really effective trap for the paddy stem-borer. But a highly paid officer, time and patience would be needed for the work and there could be no guarantee that success would ultimately be achieved.

Meantime the Entomologist is trying to find other simpler and quicker means of combating the pest. For this purpose the Narasapur taluk in the Godavari delta was selected, and a special staff of Agricultural officers was sent to work there under the Entomologist's directions. The instructions of the staff were to spread among the ryots a knowledge of the life history of the paddy swarming caterpillar and the stem-borer to explain and demonstrate the recognized method of checking the swarming caterpillar by flooding and to investigate the best method of combating the stem-borer.

It proved impossible to carry out one part of the campaign, because the swarming caterpillar did not appear in any considerable numbers in the tract this year. This is a characteristic example of the difficulties to be faced in dealing with these insect pests. They appear and disappear in such an irregular and unexpected manner that it is difficult for the Entomological officers to be on the spot in time to study the early stages of the pest and it is difficult to be certain whether the appearance or non-appearance of a pest is due to the remedial measures taken or to other natural causes. As this enemy, the swarming caterpillar did not appear the Agricultural officers had to be content with orally explaining to the ryots what they should do hereafter when the pest next appears.

As regards the part of the campaign which was directed against the stem-borer the Entomologist had no hope of finally defeating the pest in this season. His object was to study experimentally the best means of combating it and by putting the ryots in

possession of the facts regarding the life of the caterpillar to secure their co-operation in devising means to destroy it. *Prima facie* the most hopeful methods of attacking the pest were by collecting and destroying the egg masses that are laid on the paddy leaves or by collecting the withered paddy stems in which the caterpillar resides or by destroying the stubble after harvest as at that season the caterpillar finds shelter and nutriment in the stubble. The Government Entomologist knew from his African experience that children in rural tracts might be most useful in a campaign against a pest. They are easily trained to find and recognize a caterpillar or moth or its eggs and they find amusement in the work especially if a small prize is offered for success. The educational authorities were therefore approached. They readily recognized that such a practical training in natural history had a very real educational value, and they agreed to aid in inducing the children in the tract to assist in the collection of the eggs of the moth. A short lesson has now been prepared for use in rural schools of this tract explaining the life history of the pest.

But the experience so far gained in the campaign goes to show that the most hopeful means of checking this pest is by picking out and destroying all attached seedling at the time when the seedlings are taken from the seed bed for transplantation. The ordinary coolie is already able to recognize the seedling effected by the pest. Thus by a little extra expenditure on labour the worm infested seedlings could be destroyed while the crop is transplanted. If this were done systematically over a considerable tract, it appears probable that the numbers of the paddy stem-borer and the damage done to the crop would be appreciably reduced.

Another opportunity for checking the pest occurs after the harvest. At that time a generation of the caterpillar is living in the stubble left on the ground, while the daincha which has been sown before the harvest is allowed to grow up. The caterpillar lives either exclusively or at least chiefly in the paddy plant or in its stubble. The moth's life is short. Thus if there is no paddy or stubble on the ground for considerable period, the whole race of the paddy stem-borer or all but a few specimens is likely to perish. The Entomologist therefore advises that the sowing of daincha which is now done before harvest should be postponed and that the stubble should be ploughed in and destroyed. If this were done over a considerable area, it is hard to see how the paddy stem-borer could escape disaster.

Accordingly the Agricultural Department now proposes to obtain the permission of a ryot to cultivate on these lines a block of 100 acres in Tanuku taluk in the Godavari delta, for a period covering at least three paddy crops. It is hoped that the results obtained will be sufficiently good to warrant the department in recommending these methods for general application in this tract, but time alone can show whether this hope will be fulfilled.

CO-OPERATION.

Co-operative Credit in the Philippine Islands.

Mr. A. W. Práutch, Chief, Rural Credit Division, Philippine Islands, writes thus in an American Journal:—

The Rural Credit Law (No. 2508) of the Philippine Islands was enacted to remove the restriction in the Corporation Law (No. 1549) requiring a minimum of ₦2,00,000 to be raised as paid-in capital before a bank could be started, and to provide rules and regulations which would insure the operations of these associations and safeguard the interests, of the small investors, the general public, and the Government.

The associations under the new Law may incorporate with a paid-in capital as low as ₦ 100 or as high as ₦ 10,000. The share-holders who contribute this sum elect their board of five directors, who approve or disapprove the loans, sell more shares, borrow more working capital, and manage all the affairs of their association. In practice, it works out that where they have active directors the work goes forward and where figurehead directors are selected, because of their social standing or prominence, the association lags, yet this very experience teaches the lesson of self-government more effectively than theory ever could, and there is always the opportunity at the next election to remedy the condition by changing the board.

The law specifies that only one association can be incorporated in a municipality. This is to avoid rivalry and factions. The provision that the bonded municipal treasurer shall act as treasurer, ex-officio, without extra remuneration, and that Government auditor shall audit the accounts when the municipal accounts are being audited inspires the simple investors with confidence in the association. They are thus satisfied that their few pesos are safe. Possibly, no other single feature has contributed more to our success than this wise provision to protect the funds.

All payments are made by the treasurer on vouchers passed by the board of directors. No individual can own more than ₦ 500 in shares; each shareholder has only one vote irrespective of his shares; associations enjoy certain exemptions until their paid-in capital stock is ₦ 10,000. Among these are: no taxes or revenue charges, no stamps required, no registration fees on mortgages or documents, no court fees on the collection of unpaid debts, etc. The Government furnished no financial help, directly

or indirectly. These exemptions are given until the association is on its feet, and can pay its way. The organizing staff is paid by the Government, because otherwise no one would systematically and continually push this solution of how to provide the working capital for small farmers by organizing them into a "home defence guard." No one in the associations receives pay; their public spirit and civic pride are appealed to. The forms, supplies, books, share stock forms, etc., are paid for by the association out of a fund made up of a small entrance fee from each member. Everything aims to develop self-help. The agents never do for an association what it can do for itself, nor do they omit to point out the dangers learned from their own experience of a doubtful course, and the advantages of right management. Of course, anything contrary to Law 2508 is sternly stopped and the reason is clearly stated. The character of rural credit associations must, like Cæsar's wife, remain above suspicion, a condition that would not continue without a Government staff to advise and guide in this apprentice period.

From this incomplete introduction to our system we will proceed to the working out of the plan in practice. Our organizing staff visit towns, distribute copies of Law 2508, point out the benefits the whole community will reap if the small farmer can keep for himself the usurious interest now exacted for the loans he must have. It is also pointed out that this interest stays in the town instead of going to the capitalists in the large centres, and that in time a strong village bank will be the result of this co-operative effort. People who are not borrowers are urged to buy shares in order that a worthy institution may have funds to loan out. If enough interest is manifested they proceed to organization. A meeting is called and those who have subscribed and paid for shares select the incorporators, of whom there cannot be less than five or more than fifteen. From these the five directors are selected to serve until the first share-holders' meeting is held, when these or other directors are elected. The incorporation papers are registered without expense to the association. The directors then receive applications for loans and approve or disapprove them. Their action is final. If an application is approved a voucher is drawn on the treasurer and the money is paid to the borrower. The law compels security to be exacted for all loans, this may be:—mortgage on land, pledge of work animals, etc., or endorsement by "two persons of recognized solvency in the community." We work only on the personal guarantee, because the loans are small and if the borrower is doubtful or tricky his application is disapproved by the directors. We even begin a step further back and refuse admission

to membership to such characters, which reduces the number of refusals. These associations are not an attempt to reform loafers or to provide easy money for the careless, but to unite earnest, labourous farmers in a co-operative self-help association.

When the paid-in capital is £1,000 or over, an association is permitted by the National Bank to borrow a sum equal to its capital on the security of its capital and a joint and several note of the five directors, whose assessed property is certified to by the municipal treasurer. The National Bank also loans larger amounts to associations on the joint and several security of the growing crops, stored produce, work animals, sugar mills, etc., of the members, the mortgage being made out in favour of the association, which is a corporation, and this accompanies the joint and several note of the directors. There is no maudlin sentiment or mistaken pity for the poor, but practical help for those willing to help themselves. The bank charges 8 per cent to the association, which charges its members 10 per cent the profit going to the association. Twenty associations have received loans aggregating £ 80,000. Just as fast as the members fully understand this plan and are willing to assume responsibility it is being adopted. No attempt is made to urge it on unprepared associations. This arrangement gives deserving, progressive associations more working capital when they are able to use it wisely and have learned by their own effort how capital is created. I consider the "apprentice period," with its experience, of the greatest importance for the associations.

The first rural credit association was incorporated on October 19, 1916. There are now (Sept. 2, 1919) 3,842 incorporated associations and over a hundred more in various stages of organization. The paid-in capital at incorporation was 1,64,846 which has been increased by further sales of shares to over 5,00,000. There are over 50,000 members who brought these shares. Loans aggregating over 4,50,000 have been made to over 6,000 members. Our official returns from the treasurers were made on December 31, 1918. This estimate, which I believe is within the figure, is made on the reports of progress sent in by our agents.

In addition to the above-financial activities, the legislature designated the Rural Credit Associations to be the agents to loan out one million pesos to responsible persons who will plant uncultivated areas in rice and corn. The Secretary of Agriculture and Natural Resources finally passes on the applications received from associations. No loans can be made direct to individuals, the reason being that no central agency can possibly know the reliability of the applicant as well as the directors of his association do. The expense and trouble of

investigation is obviated by making the total loan to the association under precisely the same conditions as the National Bank loans to associations, as explained above. The directors having assumed responsibility for the repayment of the loan will, for their own personal protection, exercise great caution to loan this money only for productive purposes and to responsible persons. The purpose of the million peso fund is to grow enough food in the Philippines to make importation of rice unnecessary. The people need work-animals to replace those lost through rinderpest, and money for working expenses to cultivate again the abandoned fields. Applications have already been received from 170 associations for loans totalling over £ 8,00,000. These are being carefully investigated. I believe it would have been very difficult, if not impossible, to have carried out these useful loans without the co-operation of the rural credit associations with their local knowledge and community of interest.

No one cares to read about failures. In justice to the 325 associations, I am compelled to say there is not one which can be styled a failure. Two hundred are making healthy progress, the others have ailments, which, while not fatal, retard their growth. Their chief trouble is that they have been unfortunate in the selection of their directors. Yet it is their own money they manage and their own salvation they are working out, so that errors will possibly be rectified when understood. We hope they will outgrow their infantile troubles and are encouraged by the signs of improvement. In three known cases, there were men on the boards whose interests suffered by liberating the poor. Naturally, they opposed progress, but even in associations thus handicapped a large number of members clearly see the light and time and another election will remedy the temporary set-back. We have some "one-man" association; when this one man is away the machinery stops. It is not possible to insist on our type of association unless we deprive the members of their initiative and liberty and do everything for them. If these are to be "worth-while" associations, they must be co-operative, and even if it takes years to put the backward ones on their feet we shall consider the time well spent.

To quote a few of the several instances of success; San Remigio, Antique Province, is a small, poor town. Its association asked to be incorporated on July 14, 1917, with only £ 94 cash in hand. Taking into consideration their condition this was granted. Six months later, the writer visited this humble community and found they had over £ 1,000 of their own capital, and all but four pesos was loaned out. At a meeting of all the members, I heard statements of loans as small as £ 7, which had been granted to

the needy. I secured a loan of £1,000 for this valiant association from the National Bank, which doubled their working capital. They worked on with new hope, and in March 1919, they had completed 5,000 of their own paid-in capital. This with the money borrowed and deposited gives them a working capital of nearly 10,000. One example of self-development like this convinces me that the plan is adapted to the people and that the people will adapt themselves to the plan. In Sibalom, Antique Province, at a meeting of the Directors and a dozen leading members, several speakers reviewed the happenings of the eighteen months of existence of their association, and stated that the £6,000, their own and borrowed capital, had given their members a direct benefit of over £30,000. Formerly, they had been compelled to repay each peso borrowed at planting with a cavan (44 kilos, of unhusked rice. This year, the directors had supplied the really necessary money and had advised applicants how to do without unnecessary expenses, and had also advanced needed money after harvest to enable the grower to hold his rice until the market improved and he could benefit by the rise in price when the glut was over.

It is impossible in this article even to enumerate the several hundred encouraging incidents in the various associations. Let it suffice to say that the plan we are following of making the "scholar" work out his own problem instead of putting down the correct answers on his slate without his knowing why or how the "answer" was reached, really is bringing about the desired results. It would be also interesting to write of the dozen women farmers who are incorporators and directors and of the score or more Roman Catholic priests, incorporators and directors, who are helping their flocks to enjoy some of heaven this side of the pearly gates, and of the hundreds of disinterested teachers, officials, and citizens who are doing their bit to improve the associations and communities. In closing, let me frankly state that the success is due to those in the towns who are willing to sacrifice time and lend their influence to forward rural credit associations.

Our greatest problem is to impart an understanding of the principles of rural credit to the large majority of our members who know absolutely nothing about co-operation beyond that the plan, as presented to them, seemed good and they bought shares. Unless the principles of co-operation are constantly insisted on, these associations will degenerate into village money lending concerns instead of being moral and social regenerating centres. The possibilities for good of these associations are great. It will also be apparent to all that if they are not carefully supervised and strictness in payments exacted, their possibility for evil will be equally great. No defalcation or serious differences between directors have, however, occurred so far. The earnestness of the agents and well-wishers has kept the work at a high standard where we shall ever endeavour to keep it, while working to increase the number of associations and their efficiency among a people who have suffered much through usury and welcome any plant that offers relief.

INDUSTRIES AND COMMERCE.

Madras Department of Industries.

The Madras Government have laid on the Editors' Table G. O. No. 1647, Revenue (Special), dated the 28th August 1919, containing the Administration Report of the Department of Industries for the year 1918-19. The following matters of interest are contained in the report:—

During the first half of the year the department was engaged chiefly in providing the supply of articles necessary for the war. It was only after the Armistice in November that the department could give the bulk of its attention to developing the industries for the time of the needs of peace. But before turning to the work which the department is doing now that peace has come and it will be interesting to see briefly what was done in this Presidency towards supplying munitions for the war.

MUNITIONS.

The following are the principal articles that were produced for use in the war. Great quantities of Indian leather were used for boots of soldiers. Coconut oil and castor seeds were exported and hay was sent from the Madras forest areas to meet the needs of the Army. Much timber was purchased on the West Coast to make boxes for packing food and other articles required for the Army.

CLOTHS.

The Buckingham and Carnatic Mills were fully engaged in producing khaki drill, cloth and tape for the Army. The Anglo-French and the Coimbatore Spinning and Weaving Mills had large orders for pugrie cloth and dusootie. The Bangalore Woollen Mills were engaged entirely in the manufacture of army blankets. The Mysore Department of Industries organized the manufacture of army blankets amongst the hand-loom weavers of the State. In the Ceded districts, the Madras Department of Industries arranged for the production of similar blankets. The tape-weavers of Chintadripet produced khaki webbing and tape for the Army. The manufacture of tents for the Army was undertaken in Madras. The Ministry of Munitions have found out that charcoal derived from coconut shells is specially effective as a protection against poisonous gas. Messrs. Tata & Sons arranged for the manufacture of coconut shell charcoal at Ernakulum and coconut shell charcoal worth a lakh of rupees was shipped to London before the Armistice. Great quantities of coir were purchased in Madras for use in the war for rope making

and other purposes. Bamboo and palmyra mats were sent to Mesopotamia to make huts. Besides this nearly a million tiles, 40,000 gallons of fish oil and 76 tons of soap were supplied for the Army. All the leather-making and engineering firms in Madras and Bangalore were working throughout the year at their full capacity in supplying the miscellaneous needs of the Army and the Madras carpenters also were kept busy. Straps, belts, boxes for the cartridges, oil cans rivets, harness for horses, bits, stirrups, tools for digging trenches, telegraph poles, axle-trees, cart wheels, stretcher poles and many other things were made and supplied in great quantities.

We will turn now to industries which will be no less important in peace than in war. The Director of Industries points out that as Madras is not rich in metal wealth its industries must depend on the use of the agricultural products which our ryots can supply to our factories. The principal industries to be developed are therefore (1) the manufacture of leather from the hides of agriculturists' cattle, (2) the application of mechanical engineering and machines to agriculture, e.g., the use of engines for pumping from wells, (3) weaving of cotton into cloth by hand-loom in villages, and (4) the use of vegetable oils which can be extracted from ground-nut, gingelly coconuts and other plants which grow in this Presidency.

HIDES AND LEATHER.

The export of hides from this Presidency was under the control of the War Office while the war lasted. Six and a half crores of rupees were paid last year by the War Office for hides of cattle purchased in this Presidency. The tanning of goat and sheep skins had been forbidden as the supply of tanning material was sufficient only for cattle skins. The order against tanning of goat and sheep skins was withdrawn at the beginning of 1919. Owing to the scarcity of tanning materials the Government had to take control of avaram bark to prevent the price from rising too high. All the avaram bark in the Presidency was distributed at fixed prices to tanners in proportion to the number of hides formerly tanned by them. The Government also imported wattle bark from South Africa for the use of private firms. Experiments were made at the Leather school in order to find whether the bark of any other Indian tree is useful for tanning. It appears that the bark of the *Anogeissus latifolia* can be so used and much of this was collected. Some of the bark was used by the tanners even in this year, especially in the neighbourhood of Ranipet.

Experience of control by the Military authorities has showed that tanners in India suffered a great loss on account of the prevalent practice of adulterating hides. The result of adulteration was that

the leather was of bad quality and the market price for Indian leather was therefore low. The Military authorities were able to forbid the adulteration and the quality of the leather prepared by Indian tanners therefore improved and the price obtained was higher. The representatives of the Madras and Southern India Chambers of Commerce and of the South Indian Skins and Hides Merchants Association have decided to ask the Government of India to pass legislation prohibiting adulteration in peace time just as the Military authorities prohibited it in the war time. They believed that this will be for the profit of Indian industries.

MECHANICAL ENGINEERING.

Owing to the war the cost of machinery and of the oil required to drive it grew very high. There was, therefore, little increase in the use of machinery during the year as it might not pay to purchase and instal a pump for irrigation at the present high price. Further the number of rice mills installed before the war was sufficient to deal with all the rice to be milled. There were, therefore, very few new engines erected during the year.

But it is interesting to note that an arrangement has now been introduced by which the noise of oil and gas engines can be decreased, while the smell and smoke coming from them is also diminished. It is proposed to fit this appliance which is called 'Exhaust Silencing Chambers' to all internal combustion engines erected by the department hereafter within the limits of a municipality.

Compounding system.—As there are in this Presidency very few skilled artisans who can properly look after repairing engine and other power plants in the villages the department undertakes for a compounding fee of Rs. 15 per annum to inspect and overhaul any power plant three times in a year and also at other times if a special summons is sent. The owners of power plants found this arrangement convenient and are making use of it. The number of plants for which compounding fees were paid rose during the year from 143 to 158.

The owners of rice mills and other plants experienced great difficulty during the year partly owing to the shortage of rice and partly to the lack of oil for fuel. Special arrangements were made by the department with the Asiatic Petroleum Company by which supplies of liquid fuel oil indented for Calcutta were diverted to Madras and some fifty owners of engines in Madras succeeded in obtaining a share of this oil.

The power plants likely to be used in future.—The director points out that the price of oil has risen high and is likely to remain high; he therefore

thinks that in future it will be best to use engines which do not use oil but are run by burning waste products, such as rice husks or groundnut shells. In towns it is possible that electricity will be generated at one central station and distributed to the various mills and other power plants in the town.

Machines for shelling groundnut.—The best method for shelling groundnut was investigated during the year. At present groundnuts in this Presidency are shelled in two ways; one by hand and the other by machine. When groundnuts are shelled by hand the nut is first made wet so that the kernels can be easily taken out but the result of this is that the kernel goes bad rapidly. The oil produced from such kernels is rancid and bitter and not fit for food. It is only used for manufacturing soaps. Groundnuts shelled by machines are not wetted. In consequence they reach Europe in a better condition and a higher price is paid for them as they can be turned into oil to be used in cooking. Even now in the Ceded districts almost all the groundnut is shelled by machines and machines are also beginning to be used in Vizagapatam, Tanjore, Trichinopoly, Salem, Coimbatore and North Arcot. In these districts about half of the crop is shelled by machines. But South Arcot and Chingleput ryots still shell almost all groundnuts by hand.

Even the machines which are used for shelling groundnuts are not altogether satisfactory. The machines often break the kernels. The broken kernels go bad and a few broken kernels may turn all the nuts in a bag bitter. Attempts are therefore being made to devise a machine which will shell the nuts without breaking the kernels. A new machine is now being designed which, it is hoped, will reduce the breakages of the kernel to 6 per cent, whereas the old machine broke about 30 per cent. If the new machine proves satisfactory it is hoped that higher prices will be obtained for the groundnuts sent to Marseilles.

HANDLOOM WEAVING.

The department sends out two weaving parties to teach better methods of weaving throughout the Presidency. The first party was able to introduce some improvements in the mechanical contrivances used for weaving in the North Arcot district. Then the party went to Anantapur to make arrangements for the production in villages of blankets for the Army from the sheep wool that could be obtained from that district.

The second weaving party founded co-operative societies in Peddapuram and Berhampur and opened a Weaving school at Parlakimedi at the request of the Raja of Parlakimedi. In Ganjam district it succeeded in inducing the weavers in several villages

to make use of improved weaving appliances. It also started a co-operative society at Ichchapuram which supplies yarn to weavers on credit. The manufactured cloth is taken back from them at a fixed price.

DYEING.

During the year difficulties were experienced in obtaining good dyes. American dyes of inferior quality were on the market, but not first-class dyes capable of resisting constant exposure to the weather were exported to India. Such dyes were formerly made only in Germany and Switzerland. But many firms in Great Britain and America are now engaged in producing their best dyes and it is expected that dyes of the best quality will soon again be obtainable in India. Some special alizarine dyes were imported by Messrs. Best & Co. under agreement with the Board of Trade in Great Britain. Import was permitted on condition that the dye should be sold to dyers only; and the Department of Industries arranged for committees to distribute the dyes in different dyeing centres.

TECHNICAL EDUCATION.

For many years the question of industrial education in Madras has been considered. But it was only last year that the Industrial Commission laid down a settled policy. In future, the department will be able to follow that policy without fear. The Madras Trades School which was founded two years before the issue of the Commission's report was organized from the first on the lines now approved by the Commission. The Commission has laid it down that the industries which are carried on in big factories cannot be successfully taught in industrial schools where there are no factories and that industrial instruction should be provided in classes attached to the existing industrial factories or workshops.

The Madras Trades School is the most important educational institution under the charge of the Department of Industries. The school was started in 1916 with 40 students and only two classes. There are now 250 students and classes are taught in the following subjects:—

- (1) Mechanical Engineering.
- (2) Plumbing.
- (3) Electric Wiring.
- (4) Machine Drawing.

There are also special classes taught in the vernacular for maistris in wood-work, and in building. There were railway classes for 30 apprentices at the Perambur Railway Works and the number has since been increased. These men are taught machine drawing and machanics. The attendance is good and the men and boys are taught to work what is

being done in the workshops and mills in Madras. Only those who are already engaged in an occupation taught are admitted to the school.

It is interesting to notice that many well-educated boys are now entering Engineering and similar trades in which they have to work with their hands and to undergo a practical training in workshops which are engaged in a profitable trade, while they get theoretical training in the Trade schools. Formerly the number of well-educated boys who were willing to undertake practical work in workshop was very much smaller. Much of the teaching at the Madras Trade School is done by gentlemen who are employed in Engineering and other firms in Madras. The teaching is therefore thoroughly practical.

The Director hopes hereafter to extend the technical education by establishing other centres of instruction, by teaching other subjects in addition to those at present taught and by undertaking the practical teaching of more advanced and more difficult work.

INDUSTRIAL EXPERIMENTS.

Pencil factory.—The Government have set up a pencil factory to see whether pencils can be manufactured in India with profit. The result has been successful, and the factory was sold to a Syndicate headed by Mr. C. Ramanujam Chetti, which is now carrying on the manufacture of pencils. Pencils are made from a wood imported from East Africa and graphite imported from Ceylon. Suitable wood for pencils has not yet been found in Madras.

Manufacture of glue.—Experiments were made in the manufacture of glue for war purposes, and the glue produced is now being tested. Hitherto no glue had been successfully made in India.

Soap factory.—The soapworks in the West Coast were started on the advice of Sir Frederick Nicholson to prove that good soap can be profitably made and sold at a reasonable price. The soap factory will be retained by Government in order to train chemists in the soap and oil trades and to show how soap manufacture can be carried on as a village industry. It is likely that many private companies will be formed in India to manufacture soap and other articles from vegetable oils, and it is therefore important that many Indian chemists should be able to get a practical training in the chemistry of oils and soaps, so that the private companies may be able to get the services of well-trained chemists. It is likely that such companies will be ready to give employment to trained Indian chemists in the future.

It is thought also that if the villagers are taught the manufacture of soap in their houses in the village, good soap will be made in place of the impure soaps which are now sold throughout South India,

It is hoped that the soap factory which now does its work with difficulty in rented buildings will soon be greatly enlarged and improved, so that it will be possible to train those who desire to enter the industry.

The Director of Industries describes the aims of the department as follows:—

- (1) To develop and make use of the resources of the Presidency to the utmost.
- (2) To develop the resources of the Presidency to use Indian capital wherever possible.
- (3) To train the young men of Madras to an industrial life.
- (4) To help all those who seek our help in order to achieve the above-mentioned ends and to co-operate with others whose object is the same.

THE BRITISH EMPIRE SUGAR RESEARCH ASSOCIATION.

The following memorandum has been received from the British Empire Sugar Research Association, London, and is published for general information:—

The need for a British Sugar Research Association has so long been felt by sugar planters, refiners and all those manufacturing firms directly and indirectly concerned with sugar, that the formation of such an Association as has now come into being will be welcomed.

With the assistance and support of the Government Department of Industrial and Scientific Research, a strong association has now been formed, whose Memorandum and Articles of Association, and Prospectus, have received the approval of that Department, as well as that of the Board of Trade. On May 30th of this year, this Association was registered under the presidency of Sir George Beilby, who is a member of the Advisory Council of the Government Department of Industrial and Scientific Research. The Vice-Presidents are the following distinguished gentlemen:—The Rt. Hon. Lord Bledisloe of Lydney, K.B.E.; Sir Daniel Morris, K.C.M.G., D.C.L., D.Sc., LL.D.; Sir Edward Rosling; Professor E. J. Russell, O.B.E., D.Sc., F.R.S.; Professor W. Bateson, D.Sc., F.R.S.; Professor J. Bretland Farmer, D.Sc., M.A., F.R.S., and Mr. Edward Saunders.

The gentlemen elected to the Council represent every branch of the Sugar Industry throughout the Empire.

The aim of the Association is to establish, in co-operation with the Government Department of Scientific and Industrial Research, an Empire Scheme for the scientific investigation, either by its own officers, or by Universities, Technical Schools and other Institutions, of the problems arising in the Sugar Industry, and to encourage and improve the technical education of persons who are or may be engaged in the Industry.

The Association is inviting all those who are engaged in any Branch of the Sugar Industry within the Empire, to become members, and thus become eligible for benefits resulting from the scientific investigations it will carry out.

While it may be admitted that research work has always been proceeding in scattered localities of the Empire, where cane and beet are grown, and also in England where sugar is refined, as well as in Factories where sugar is an ingredient for the manufacture of the finished article, such research is carried out by the Factory's Chemist, who works continually for the improvement of sugar manufacture. Such improvements, however, often remain only half investigated, owing to the time given to routine work, which is the main occupation of the Factory Chemist. There are few factories who can employ a highly skilled chemist mainly for research work, therefore the necessity for an organized association where research will be carried out by the best brains for the general benefit of the Empire sugar industry, is felt daily more and more.

The scope of the work to be done by the Association will include the investigation of problems arising in all branches of the sugar industry, including the improvement of the sugar-cane, sugar beet, the various methods of extracting the sweetening matter from cane and beet, the various process of refining, and the best methods for the use of sugar employed by manufacturers using sugar as one of their raw materials, as well as the discovery of the best uses of the after-products of both factory and refinery.

In order to make the research work of the Association of the greatest possible utility to the industry, power has been taken, not only to encourage the training of research workers, but also to improve the technical education of persons, engaged, or likely to be engaged, in all branches of the sugar industry.

A survey is being made of the field of research which is likely to be beneficial to the Industry, and it is hoped that members of the Association will be

willing to assist in the framing of a thoroughly comprehensive scheme, by making suggestions relating to that part of the industry, with which they are intimately acquainted.

It is also proposed to establish a bureau of information for the sugar and allied trades industries, to which any member of the Association can apply for assistance in the technical and other difficulties which he may encounter in his business.

By means of its various activities, as an Association for sugar research, a bureau of information, and a centre for the furtherance of technical education, it is hoped that the British Empire Sugar Research Association will exercise a far-reaching and beneficial influence on the future welfare of this ancient and important industry.

INDIGO INVESTIGATIONS AT PUSA.

I. Botanical.

We take the following from the Report of the Imperial Economic Botanist at Pusa for the year 1918-19:—

In the last year's report, a somewhat detailed account was given of the work in progress on Java Indigo. This dealt with a study of the conditions necessary for growth and for seed formation, of the factors of importance in root development and of the principles underlying improvement by selection. These investigations are being continued and extended. During the past year, a number of interesting results have been obtained many of which bear on the practical aspects of the industry.

INDIGO WILT.

One of the difficulties encountered in the cultivation of the Java indigo in Bihar is a condition known as wilt. After the middle of the monsoon, it often happens that the Java plant ceases to thrive, growth slows down, the foliage changes colour and afterwards becomes progressively reduced in amount. This is followed by the gradual death of the plant. Associated with the wilted condition during this period is extensive destruction of the fine roots and nodules. As there appeared to be a connection between the rise of the subsoil water in Bihar and the development of wilt, a series of lysimeter experiments was carried out in 1918 in order to determine whether or not there is any relation between water-logging from below and the appearance of this trouble. The lysimeters consisted of cemented tanks, 1000 of an acre in area, built above the ground level and provided with drainage openings

which could be closed or opened at will. Two series of three lysimeters were constructed. One set was filled with soil from the Kalianpur farm near Cawnpore, the other with light Pusa soil. The Kalianpur soil is exceedingly rich in available phosphate (0.318 per cent) while Pusa soil, when analysed by Dyer's method, gives very low figures for available phosphate (0.001 per cent). The results obtained were as follows :—

- (1) In both Pusa and Kalianpur soil, the indigo in the lysimeters with free drainage escaped wilt.
- (2) When the drainage openings were closed and water logging from below took place, all the plants were wilted in both Kalianpur and Pusa soil.
- (3) The wilt in the Kalianpur soil (rich in available phosphate) was much more pronounced than in Pusa soil (said to be low in available phosphate).
- (4) The growth in Kalianpur soil was much slower than in Pusa soil.
- (5) The stoppage of drainage brought about an interesting change in the root system of the indigo and caused the laterals to run near the surface.

ROOT DEVELOPMENT.

The systematic examination of the root system of this crop throughout the year, in various soils and under different conditions of growth, continues to yield interesting results. This work is still in progress and is not likely to be completed for some time. The effect of previous waterlogging on stiff soil on the root system is very marked. Five months after sowing, equal areas on the waterlogged and control plots were taken and the heights of the plants were measured. On the waterlogged plot, the average height of 200 plants was 10.4 cm., on the control the average height of an equal number of plants was 28.0 cm. When the root system of the plants on these plots was examined, it was found that the first effect of waterlogging was to restrict the roots to the upper layers during the first few months of growth and to change the general character of the root system. The development of the tap root is soon arrested and later in the season one of the laterals after bending takes its place. When the sub-soil is more porous, the effect of waterlogging before sowing is less.

SELECTION.

An important discovery has been made and utilized in the selection work in progress on Java indigo. Some time ago it was observed that if any set of August sown seed plants is cut back during the early hot weather, there is a great range in the

capacity of the individuals to form new growth. There is every gradation between abundant and rapid new growth and the development of weak wilted branches.

SEED PRODUCTION.

For the fifth year in succession, the continuous Java indigo plot in the Botanical Area yielded a fine crop of seed in spite of an unfavourable season due to the heavy rains in August just after sowing and to the early cessation of the monsoon in September. This plot has never received any artificial manure nevertheless the seed crop continues progressively to improve. A good crop was also obtained on a field lent by the Dholi Estate. In this case also no artificials were applied to the land and the present is the third crop of indigo seed which has been raised during the last three years.

In connection with these field results, the effect, on the growth and seed formation in this crop, of alterations in the soil texture was investigated by the modified system of pot culture described in a paper read at the Indian Science Congress at Lahore.* In this method, the soil conditions down to a depth of two feet can be altered by the addition of such aerating materials as sand, broken tiles and leaf mould or a combination of these substances. The effect on the growth and seed formation is given in the table on page 341 where the results are expressed in grammes in terms of 50 plants.

The effect of altered soil texture on growth and seed formation in Java Indigo.

Soil treatment	Weight of dry stems (excluding leaves)	Weight of dry seed
1. Control (soil disturbed) ...	68	32
2. Soil 1/2 + sand 1/2 ...	127	70
3. Soil 9/10 + potsherds 1/10 ...	118	92
4. Soil 8/10 + potsherds 2/10 ...	141	94
5. Soil 7/10 + potsherds 3/10 ...	136	89
6. Soil 4/10 + potsherds 3/10 + leafmould 3/10 ...	744	511
7. Soil 7/10 + leafmould 3/10 ...	907	577
8. Soil 5/10 + potsherds 2/10 + leafmould 3/10 ...	905	595
9. Soil 6/10 + potsheds 1/10 + leafmould 3/10 ...	715	685
10. Control (soil disturbed) ...	72	32

* *Agricultural Journal of India*, Special Indian Science Congress Number, 1918, p. 36.

An inspection of the table shows that while the substitution of ten to thirty per cent of the soil by potsherds multiplies the yield of seed three times, the effect of leafmould with or without potsherds was much greater. Thus the substitution of forty per cent of the volume of the soil by leafmould (30 per cent) and potsherds (10 per cent) increased the production of seed twenty-one times. Another interesting feature was the cessation of growth in length in all cases at the beginning of December quite independently of the soil conditions or of the size of the plants. This always occurs under field conditions. For large yields of seed, large plants must be produced by the beginning of December and practically all the seeds must have set by this time. Bearing in mind the small amount of growth which is possible up to the beginning of October, it is evident how rapid the development must be during October and November if crops of seed over ten maunds to the acre are contemplated.

THE GROWTH OF INDIGO.

A large amount of careful experimental work has been carried out on the conditions necessary for the establishment of the ordinary crop. Sowing should be done early—if possible before the *hathia* in the beginning of October—and the land should be clean fallowed and well cultivated beforehand. Later sowings are nothing like so successful. As regards the soil conditions necessary, the addition of moderate dressings of organic matter, applied in the hot whether or on the early rains, greatly assists in the establishment of the seedlings and in the early growth of the crop. If sown on very poor land, it has always been observed that Java indigo establishes with great difficulty and that numerous blank spaces occur. These results indicate the need of combined nitrogen for the early growth of this leguminous crop. This was confirmed by the behaviour of indigo on plots uniformly manured with 15 maunds of oilcake to the acre, a portion of which was waterlogged for a month before the crop was sown. It is known from previous experience of the Pusa soil that waterlogging for a month during the late monsoon is sufficient to bring about extensive losses of combined nitrogen through denitrification. On the waterlogged portion of the plot, the indigo grew with great slowness at the beginning compared with the control and this difference has always been maintained through the hot weather. Thus the field results as well as those secured by the modified system of pot culture, all point to the need of combined nitrogen in establishing a good stand of Java indigo. On the other hand, it is well known that heavy dressings of substances like *seeth*, oilcake, and farmyard manure stimulate vegetative growth at the expense of indican formation, a process which takes

place best if the plant is grown on land somewhat on the poor side. An interesting field of investigation is therefore indicated. It may be found to pay to stimulate the crop a little by means of organic matter so as to establish it rapidly and strongly even if the yield of indican per 100 maunds of green plant is thereby slightly reduced. The increased produce of indigo per acre might be found to pay. Such a matter, however, cannot be settled by experiments on small plots on account of the well known difficulty in Bihar of obtaining even land to the depth made use of by this crop, and of manufacturing small lots of green plant. It is a matter which will have to be decided by general experience of work under estate conditions. Possibly the easiest and most economical method of testing the point would be to manure for the previous crop and to raise the indigo on land in fair condition.

II. Bacteriological.

The following are extracts from the Report of the Imperial Agricultural Bacteriologist (Mr. C. M. Hutchinson) for the year 1918-19:—

The isolation of considerable quantities of pure indican in the laboratory of the Indigo Research Chemist permitted the use of synthetic media for the cultivation of the various strains of indican hydrolyzing bacteria already isolated in the Bacteriological Section during two previous seasons on agar made up with indigo leaf extract. It was found that very little growth or hydrolysis took place in media in which indican was the only source of nitrogen, whereas the addition of small quantities of leaf extract activated this at once. Study of the physiological aspects of this question is being carried on.

MANUFACTURE.

Further experiments were carried out in the experimental factory on the hot water extraction method. Very good results were obtained by the use of lima precipitation following extraction and preceding inoculation with hydrolyzing bacteria; the improvement not only included higher percentage extraction of the indican present in the plant, but greater purity in the product. Experiments were initiated in the use of hypochlorite sterilization of the water and plant as an alternative to hot water extraction; this would be a very much cheaper method of eliminating undesirable bacterial flora than the use of hot water, but it is not yet clear, whether it will be possible to obtain the high percentage extraction of indican given by the latter process.

A point of great practical interest arose during the first days of manufacture. It has found that

owing to the "weathering" of the cement-lining surfaces of the vats during the months intervening between one manufacturing season and the next following one, lime was set free by disintegration in sufficient quantity to produce an alkaline reaction in the steeping water of such a degree as to interfere seriously with the growth and activity of the hydrolyzing bacteria; in this way fermentation was delayed to such an extent that even after twelve hours this process then normally complete was only just beginning. It was found necessary to add considerable quantities of acid (250 c. c. of 50 per cent sulphuric acid per 600 gallons) to neutralize this alkalinity. There can be no doubt that a similar action takes place in all factories using cement-walled vats, and that the "warming up" of the vats commonly noticed at the beginning of each season is due partly to the removal of the disintegrated lime from the walls as well as to the gradual establishment of the necessary bacterical flora.

It is of interest to note here that numerous reports have been received from indigo factories of improved yields resulting from the use of cross walls or other methods of increasing the wall area of the vats, recommended (1917-18) as a result of the discovery of the importance of bacterial action in the fermentation of the indigo plant.

INDIAN STORES COMMITTEE.

The following resolution (No. B. 506-11, dated the 5th December, 1919), of the Government of India, Indian Munitions Board, on the constitution of a Committee to devise a scheme for the proposed purchase of stores in India, is published as a supplement to last week's *Gazette of India*:—

The most obvious and direct form of assistance which the Government of India can give to the industries of the country is by the purchase of supplies required for the public services so far as possible in the country itself. This principle is already clearly expressed in the existing Stores Rules, although their key note is economy, an essential factor in any scheme for the purchase of Government stores; but indenting officers have in practice been too often deterred by the risk involved in purchasing in India in the absence of an expert purchasing and inspecting agency. It follows, therefore, that the constitution of a fully equipped stores agency in this country is a very important item in

the policy of industrial improvement on which the Government of India are now embarked.

2. The foregoing principles were set forth by the Indian Industrial Commission, accepted by the Government of India and approved by the Secretary of State; they have already been put into practice to a limited extent under war conditions by the Indian Munitions Board and the time has now come to give them permanent effect. The Government of India have, therefore, with the sanction of the Secretary of State, decided on the appointment of a Committee to work out a detailed scheme.

3. There are, however, other factors which must be considered in framing any such scheme. In the first place, the Provincial Governments have generally expressed a desire for some measure of freedom in arranging for their own purchases, although they recognise the assistance that the creation of an efficient central purchasing and inspecting department could afford, even to the largest and best equipped provincial Stores department. Although from the point of view of the producer Provincial Governments are not individually very important purchasers in comparison with the large consuming departments of the Government of India, yet their demands are on a sufficient scale to make the waste of public money, which inevitably attends inexpert purchase and ineffective inspection, run into considerable figures; and this is bound to lead in the long run to dissatisfaction with local sources of supply. It will be for the Committee, in consultation with the officers of Local Governments and with private suppliers, to devise a system which will, so far as possible, meet the wishes of Local Governments, while securing to the fullest extent practicable the great advantages of centralised purchase, thereby eliminating competition between the different Government agencies, and of an expert and highly specialised inspecting agency, whose advice and assistance will be of no less value to the private manufacturer than to the Government indenter.

4. The great railways of India, whether Company or Government lines, are large consumers of stores, and have, therefore, found it necessary to create their own agencies for holding stocks, and for effecting local purchases, the latter being often on a very considerable scale. There is, however, at present no agency for ascertaining whether stores bought through the Director-General of Stores could have been obtained in India; nor do the railways possess any specialised purchasing or inspecting agency for the different classes of articles which they require; but they are able to rely to some extent on the Superintendent of Local Manufactures and on the Test House at Alipore to check samples of articles locally obtained. The usefulness of the institutions

has been considerable, though limited in direction ; and proposals are on foot for establishing another test house in Bombay. The Government of India, who have large financial interests in railways, desire to have before them clear information regarding the probable benefits which railways could expect from the assistance and advice of a fully equipped stores agency, and as to the lines on which that assistance could be most advantageously afforded. In this connection it will be desirable for the Committee to frame proposals for the future control, duties and equipment of the existing test house and for the provision of additional test houses if necessary.

5. The method of providing military stores is a matter which will be doubtless considered by the Committee, which has been appointed to report on the administration and organization of the Army in India. This Committee will derive great assistance from the conclusions of an expert body such as that which is being appointed under this Resolution ; and the Government of India consider that the most convenient procedure will be for the Indian Stores Committee to proceed with their enquiries on the assumption that the military authorities will require to be provided with stores purchased in India under much the same conditions as other departments of the Government of India ; but to ascertain from time to time the views of the Committee on the Army in India, and have regard in framing their own proposals, so far as appears to them proper and feasible, to the views of that Committee.

6. The Government of India have had under consideration the question of the purchase of food and fodder for the army. It has, however, been decided not to include this question within the scope of the present enquiry.

7. The Government of India have decided to constitute a Committee to enquire into the matters indicated in this Resolution, and to frame a definite and so far as possible a detailed scheme for the purchase and inspection of stores in India. Certain general principles have been, it will be observed, accepted by the Government of India and the Secretary of State. It will not be necessary for the Committee to discuss these further ; and they should concentrate their attention on the difficult and complicated task of devising a scheme which will as far as possible meet the needs of the different interests concerned, while keeping fully in view the fundamental principles of efficiency and economy.

8. The Committee will consist of the following gentlemen :—

President :

1. Mr. F. D. Couchman, M.I.C.E., Member, Railway Board.

Members ;

2. Mr. G. H. Collier, C.I.E., Director-General of Stores, India Office, London.
3. Mr. F. Palmer, C.I.E., M.I.C.E., M.A.S.C.E., F.R.G.S., late Chief Engineer, Port of London Authority,
4. Colonel H. A. K. Jennings, C.I.E., Inspector of Quarter-master General's Services.
5. Lieutenant-Colonel C.C.H. Hogg, C.M.G., R.E., Superintending Engineer and Secretary to the Hon'ble the Agent to the Governor-General in Rajaputana in the Public Works Department.
6. Mr. H. N. Heseltine, C.I.E., Accountant-General, Railways (*Retired*).
7. Mr. A. W. Dods, of Messrs. Burn & Co., Calcutta.
8. Rai Bahadur Lala Milki Ram, Chief Store-keeper, Oudh and Rohilkhand Railway (*retired*.)
9. Mr. Lalji Naranji, of Messrs. Lalji Naranji & Co., Managing Agents, the Jupiter General Insurance Co., Ltd., Bombay.

Mr. J. C. Highet, Assistant Secretary, Railway Board, has been appointed Secretary to the Committee.

9. The terms of reference are as follows :—

In view of the necessity of encouraging Indian industries, while at the same time securing economy and efficiency in the purchase of Government requirements, the Committee should enquire and report :—

- (a) What measures are required to enable the Departments of the Government of India and of Local Governments to obtain their requirements as far as possible in India, and what central and local agencies for purchase and inspection should be constituted ;
- (b) What should be the relations of such agencies with one another and with the Stores Department of the India Office, or such other purchasing organization in England as may hereafter take the place of that Department ;
- (c) What modifications of the Stores Rules will the scheme recommended by the Committee necessitate.

EDUCATION IN AMERICA.

Scholarships.

Frances Adney writes to the *Commonweal* :—

Nearly all the better-equipped private educational institutions in America possess special funds for assisting needy and deserving students. Some of our State institutions also give this type of aid. A "scholarship" is an annual stipend, generally large enough to cover the tuition fee, often somewhat larger, which is granted to a student of good ability and character upon the representation of his needs.

Some scholarships are awarded as prizes for high scholastic standing, without reference to the student's financial status. Some again are bestowed only upon those students who have demonstrated marked capacity, and are also known to need pecuniary assistance.

Some institutions have loan funds, from which a student may borrow, if he can give good security.

Large stipends, called "fellowships" (viz., ranging from \$ 150 to \$ 600 per year), have been established at many Universities for the benefit of graduates and professional students of unusual ability and promise. Certain of these fellowships for students in graduate schools carry the obligation of teaching from one to six hours a week in under-graduate classes. A few Universities maintain travelling fellowships some of which pay as much as \$1500 per annum. These are generally awarded to advanced students whose researches might be especially furthered by visiting some foreign country.

The foreign student is advised to apply for the catalogue of any College or University to which he may feel attracted. A catalogue or circular of information is sent free on request, and generally contains full information concerning scholarships, fellowships, teaching staff and equipment.

It would be prudent for any Indian seeking education here to have funds to cover his first year's expenses, unless he has friends who can assist him to find work. There are many opportunities here for making one's own way through college; almost countless ways of earning a living; yet, in a new country, amid strange customs, an Indian might find himself seriously handicapped during the first year of his residence.

The foreign student contemplating a three or four year period of University study in the United States should understand that there is each year a long vacation, American schools and colleges being in session on an average of about eight months in the

year. The University year generally begins about the middle of September and closes about June 15th. (Californian schools vary widely as to the time of vacations, owing to climate differing essentially from other sections of the country; but the aggregate length of vacation time is about the same through the States.) At some institutions the University year is divided into two semestres, the division line coming about the 1st of February; other colleges divide the year into three semestres. Approximately a month is devoted to short vacations of from one to fourteen days' duration scattered throughout the academic year. The prices quoted by different colleges for dormitory room-rent is generally for the academic year of nine months, Occupancy of the rooms during the short vacations is included. Students are usually not allowed to occupy dormitory rooms during the long summer vacation.

This long summer vacation gives the poor man or woman an opportunity to earn money. For the student who can afford it, it is exceedingly desirable that he should spend at least a part of the summer in travel. The United States contains many racial stocks, many of them concentrated in limited areas; and its industries, climate and conditions of living are so varied that no single community can be regarded as typical.

Realizing the need of detailed information for foreign students as to American school systems, the U. S. Secretary of the Interior, Washington, D. C., directed Dr. Samuel Paul Capen, specialist in higher education in the Bureau of Education, to prepare a document for publication which should cover this field. This educational guide is the source of much of the following information.

The American educational system cannot be treated as a unit, for it comprises many varieties of organizations in forty-eight independent States. There is a network of colleges, universities, academies or fitting schools, high and elementary schools covering the entire land. Parts of this system are as follows:

Elementary schools within the reach of every home.

High schools, or secondary schools, in every considerable town.

Land grant colleges, with special reference to the agricultural and mechanical arts in all the States.

State Universities in practically all States except a few eastern States.

Normal schools, or training schools for teachers, in every State.

Free schools for defectives in all the States.

National academies for training officers for the army and navy.

In addition to the above outlined public educational system, there are many well-equipped institutions

of private foundation, such as kindergartens, music and art schools, industrial and professional schools, denominational colleges and universities, and universities and colleges supported chiefly by private endowment.

The American college seems to have no exact counterpart in the educational system of any other country. It occupies the place of central importance in the outworking of higher education here, being the repository and shelter of liberal education, as distinguished from technical or commercial training. Traditionally, its curriculum covers a period of four years, and grants baccalaureate degrees. There are usually three kinds of under-graduate degrees, Bachelor of Arts, which usually requires the two classical languages of Latin and Greek; second, Bachelor of Science, which, before the War, required the two modern languages of French and German, and the third, Bachelor of Philosophy, requiring Latin and one of the modern languages.

Even before the War, when standards were not in their present fluidic state, the most significant feature of American Universities and colleges, was their lack of standardisation. The two are often confused, although according to the recognized definition, "a college is a simple institution with at least six professors giving their entire time to college and university work, a course of four years in liberal arts and sciences, and requiring for admission not less than four years of high school preparation, in addition to grammar school studies." The University, on the other hand, is a complex institution which includes, in addition to the college proper, several specialised departments and professional schools, such as colleges of engineering, agriculture, medicine, veterinary medicine, dentistry, law, commerce, journalism, pharmacy, education and theology. At the top of all is the Graduate School of Arts and Sciences, which grants the degree of Ph. D. on the completion of at least three years' work in some special field of research.

The following departments are usually established by an American University: Philosophy, Psychology, Education, Political Economy, Political Science, History, History of Art, Sociology and Anthropology, Household Administration, Comparative Religion, Oriental Languages and Literatures, New Testament, Old Testament, Comparative Philology, Greek, Latin, Romance Languages, English, German, General Literature, Mathematics, Astronomy and Astrophysics, Physics, Chemistry, Geology, Geography, Zoology, Anatomy, Physiology, Botany, Pathology, Hygiene, Bacteriology, Public Speaking and Physical Culture.

Admission to practically all institutions of higher education is based on the completion of a four-year

course in a secondary school, which, expressed in the terms of "unit" is equivalent to sixteen units. A unit represents a year's study in any subject, constituting approximately a quarter of a full year's work.

This statement is designed to afford a standard of measurement for the work done in secondary schools. It takes the four year high-school course as the basis, and assumes that the length of the school year is from 36 to 40 weeks; that a period is from 40 to 60 minutes in length; and that the study is pursued for four or five periods a week; but under ordinary circumstances, a satisfactory year's work in any subject cannot be accomplished in less than one hundred and twenty 60-minute hours or their equivalent. Schools organized on any other than a four year basis can, nevertheless, estimate their work in terms of this unit.

Two methods of admission are common. Throughout the West and Middle West, and, to a certain extent the east also, Colleges and Universities admit by certificate. Under this plan, a candidate for entrance must present a statement from the principal or head-master of the school which he has attended, showing the amount and character of the work he has done. If the certificate indicates that the studies required for entrance have been satisfactorily pursued, and if the standing of the school issuing the certificate is known and approved by the college authorities, the student is admitted without further formalities.

The other method of admission, in vogue in a number of the older institutions of the Eastern States, is by examination. In order to systematise both the entrance examinations, and the courses offered by secondary schools in preparation for them, some 30 institutions which admit by this method, together with the principal associations of colleges and secondary schools, have formed an organization to conduct examinations, known as the College Entrance Examination Board. A student is admitted to any college which is a member of the Board if he passes the examinations set by the Board in the subjects required by the college for entrance. The standards maintained by the Board are so high that a certificate showing that a candidate has passed its examination is generally accepted for entrance by all American institutions for higher education, although a few insist upon conducting their own examinations.

This College Entrance Board holds examinations in almost every State of the U. S., and, as late as 1916 (and probably at the present time) in Honolulu, Oahu College, and at University College, Gower Street, W. C., London, England. A document

showing places of examination will be sent on receipt of 10 cents by the Secretary, Post Office Substation 84, New York City.

Detailed information of various College and University requirements may be obtained by request from The Bureau of Education, Washington, D. C., U. S. A. The two tables herewith appended, however, should enable the student to determine in some measure his probable ability to enter a standard College or University. The tables should be used together, the first indicating the range of subjects required or accepted; the second the scale of values in terms of units endorsed by the College Entrance Examination Board. Most institutions are willing to make some concessions from the strict letter of the requirement to students from foreign countries who can demonstrate an equivalent preparation in subjects other than those prescribed.

Some years before the War, a Swiss girl determined to get an education in America. There was no co-education in her country. While her brothers were sent to college, she studied and worked at anything practicable in order to earn sufficient money to bring her here. Her parents would not consent to her plan, and she was obliged to wait until she was twenty-one before she could leave Switzerland. The catalogue of Leland-Stanford University at Palo Alto, California, had fallen by apparent chance into her hands; but the requirements were not clear to her mind. However, she was strongly attracted to the place. She wrote to the Registrar stating her acquirements which were mostly linguistic and literary. The Registrar took a kindly interest in her and advised her to come and make up the requisite entrance studies after her arrival. This heroic little Swiss woman set forth, without a friend or acquaintance in America; and, after reaching New York, she was by mischance routed over the southern railway system, which took her many miles out of her course, and so exhausted her little money-store that she arrived in San Francisco with exactly \$2-50 in her purse. That amount was sufficient to take her to the college, where the Registrar took her into his home for a time. She not only earned her college expenses, and made up the requirements but she did a four years' course in three years, and gained in addition a scholarship which enabled her to do Post-graduate work in the University of California. She is a splendid example of pluck and brilliant mental endowment combined: and, to make the tale complete, she married a Hindu and is living happily in the Hawaiian Islands.

BOOKS IN BRIEF.

Economic Problems of Peace After War.—*First and second series.* By W. R. Scott, M.A., D. Phil., Litt. D., LL.D. Adam Smith, Professor of Political Economy in the University of Glasgow. Published by the Cambridge University Press. Price 1st Series 4sh. 6d. net and 2nd Series, 6sh. net.

These volumes by Dr. Scott deserve high praise, not only for the knowledge they bring to bear on the great problems of peace after war but also for the lucidity with which they deal with them. The first series forms a sort of introduction for the second, though in itself it is full of suggestive thought. There is so much in it that is dealt with in the true spirit of the scholar that we should be sorry to detail here its contents. To take only one subject dealt with by Dr. Scott: The future arrangement of industry. What should it be? He discusses the point how far the influence of evolutionary theory may have disguised the facts. Industry, in his opinion, should be considered here as an evolutionary process than as a problem, namely the attaining of a harmonious relation between the human agents concerned in each individual act of Production. He thinks that the larger part of the practical steps in the future will be the recognition of the problem as to the need for a less imperfect co-operation of the various factors of Production. In the second series, Dr. Scott discusses many interesting topics, one of the chief of which is that of the financial burden created by the war and how to deal with it. Conscription or Prescription? The historical knowledge that is brought to bear on this subject should render impossible a hasty decision in the matter. He also discusses in one interesting chapter as to what should guide us during the period of financial transition. Both the series form in our opinion, a real contribution to the subject of War Finance and as such ought to attract wide attention.

The Making of Modern England.—By Gilbert Slater, M. A. D.Sc. Published by Messrs. Constable & Co. Ltd. London. Price 7sh. 6d.

We have read this book with great interest from cover to cover. The story of the making of England is told with skill by Dr. Slater, the space devoted to political, Economic and social factors being illustrative of the great sense of proportion he has displayed in handling the highly difficult task he set himself. We think he has made good in his treatment of the subject the ideal he wishes critics and writers should bear in mind in the discussion of economic topics. "The claim I make," he says in the preface to his book.

"is that the raising of party conflict round any question of economics or politics must not be allowed to exclude the question from the field of scientific research, but that on the other hand, the fiercer the conflict, the more necessary it is for the ordinary citizen to endeavour to bring to his judgment of the issue the same freedom from bias and loyalty to truth with which the historian studies the bases of the social order of Athens, or the wars of the Egyptian King. India comes in once or twice for attention in the book and we think Dr. Slater has something useful to say on each occasion.

"The first and greatest of all the problems of Empire is the problem of India" says Dr. Slater. He then goes on:—

"Among the prominent facts with regard to India which are confessed in the Statistical Abstract, are that the average death-rate for the ten years ending 1908 was between thirty-four and thirty-five per thousand, which represents an excess of unnecessary deaths, judging by the standard of a country like Japan, of some four millions per annum. Poverty and ignorance are the obvious causes of this appalling death-rate. The fundamental duty of the Government is to protect the people against devastating plagues and famines; and the obvious means of doing so is to train the most gifted of the native population to lead the people in the fight against the evils which beset them. How little the British Government in India realises this duty may be judged by the statistics of graduates turned out in the year 1909-10 in different professions; in medicine there were but thirty, in engineering only seventeen; in Agriculture not a single one; but in arts there were 2,116, and in law 576."

His complaint is not against the Indian Civil Service but against the system. He formulates his grounds thus:—

(1) "That the English Civil Servants in India are too few and too much absorbed in the duty of maintaining the Government as it is and in dealing with difficulties like plague and famine, to have leisure and energy to tackle the great problem of lifting up the whole standard of the material well-being of the natives.

(2) That the ghost of the economic doctrine of *laissez faire*, and other obsolete ideas which allow only a very restricted scope to the energies of the Government, still cling round our actual practice, so that it is scarcely regarded by parliament or by the Office of the Secretary of State as an urgent matter that the Government should seriously set itself to work to minimise Indian poverty.

(3) That the method of training of our higher Civil Servants is entirely inadequate and unsuitable. Education in the public schools and at Oxford is about the worst possible preparation for training a man to see how to utilise every development of mechanical and biological science, medicine and hygiene, for the benefit of an Asiatic people."

If Dr. Slater writes frankly it is with a view to have matters remedied. It is to be hoped that under the new form of Government sanctioned by the Indian Reform Act adequate remedial measures will be adopted.

British Budgets, 1887-1913—By Bernard Malet, C. B. Published by Messrs. Macmillan & Co. London. Price 12sh. net.

This is a fascinating book and deserves the very highest praise. The story of each British Budget during the years 1887-1913 is unfolded by Mr. Malet in a manner at once impressive and taking. Nothing can be more difficult than that even for the most skilled writer in dealing with figures and facts such as a Budget usually deals with. Mr. Malet manages to present each Budget—its salient features, its departures, its new points and the criticism it evoked in either House of Parliament—in an amount of space which must, relatively speaking, be described as brief. He manages to say much in the limited range he sets himself to. His own criticism wherever it is offered is both brief and suggestive. Whether it is Gorchon or Harcourt, or Asquith or Lloyd George that he is dealing with, he is eminently fair and just both in his presentment and estimate. We would suggest a close and intimate study of this book by those interested in finance matters generally in this country. There is a great need here for clear thinking in financial matters and it is books of this kind that are likely to help towards an accurate knowledge of the intricate and often unintelligible points that go to make up a nation's budget. We commend the book to the attention of all interested in finance in India students and laymen alike. The book lacks an Index and we shall be glad to see it supplied when a new edition of the same is issued.

Money.—By Edwin Cannan, M.A., L.L.D. Professor of Political Economy in the University of London. Published by Messrs. P. S. King and Sons, Ltd. 1 and 4 Great Smith Street, Westminster.

Dr. Cannan is so well known in India for his works on Economics that we are sure his present book on Money will be welcomed by a large circle of readers in this country. In this little book Dr. Cannan furnishes a scientific explanation of the connection of money with rising and falling prices. He shows that

economic laws are inexorable in their effect and that if those who are responsible for adding inordinately to the paper currency of the country do not take heed in time there is likely to be trouble. Dr. Cannan is no alarmist; he is a sober, scientific thinker. His analysis of the existing currency position is in our opinion, both sound and just. He thus states his conclusion. "The conclusion of whole inquiry is that the value of money, which is the same thing as the general level of prices regarded inversely, is an anomalous or even very peculiar thing, but depends in the same way as the value of other commodities upon the various influences which affect demand and supply: and that if peoples dislike the rise of prices which is another name for a fall in the value of money they should insist on adequate limitation of the supply of money. This is a conclusion which has long been familiar to economists; it is time it was granted by the men who pride themselves on being practical."

The Safety of the Nation.—By Ian D. Colvin. Published by Mr. John Murray, London. Price 6sh. net.

There is so much that is fresh in the view point of Mr. Colvin that there was hardly any need for him to fall from the classical school of Economic thought either for their errors of omission or commission or for the purpose of obtaining currency for his own views. Mr. Colvin's main point is that security before opulence should be applied to every trade and industry. Adam Smith long ago remarked justifying the Navigation Laws, "Defence is more important than opulence." Mr. Colvin seems to admit as much at p. 15 of his book. Mr. Colvin, however, thinks that he treated his observation "as an exception, not as a ruling principle." We are not so sure of that. What Huskisson and others did in the nineteenth century, to which Mr. Colvin refers in Chapter III of his book, was in our opinion, to undo the evil effects of the Navigation Laws. Huskisson declared that security was of the first importance and that commerce should give way to navigation in case of conflict, which is a view quite in keeping with Adam Smith's great diction. Mr. Colvin thinks that Huskisson paid lip worship to our ancient National policy of security. Few dispassionate writers will agree with this verdict. This apart, Mr. Colvin is all for a national party that would make security of each industry its cardinal article of faith. In this view the British Empire producers' organization receives his praise. He writes:—"A national party founded upon industry would have a national inspiration, a national ideal. They would insist that the points of British industry went to the British people; they would oppose the free importation of foreign subjects as much as the free importation of foreign wares; they would recognise British national-

lity as a birth right which was no longer to be sold for a licensing fee, and they would admit aliens only to teach us those arts and crafts of which our people were ignorant." Mr. Colvin deserves praise for the courage with which he puts forth his convictions.

Coal Nationalisation.—By Edwin Cannan, M.A., LL.D. Published by P. S. King & Son, Ltd. London. Price 2sh. net.

This is a precis of the evidence offered by Professor Cannan to the Coal Industry Commission. From the prefatory note annexed to the booklet, we note that Professor Cannan publishes it because the whole of his evidence including his written precis has not been given publication to in the official Report of the Commission. This is as it should be as a great many like Professor Cannan do not like to go down to posterity even in a blue-book, in the form of "selections." Professor Cannan is not entirely destructive in his views; he is, as may be naturally expected, of distinguished scholar like him, as well constructive. Though opposed to nationalization, he is for greater publicity of mine profits and for the creation of a miner's dividend. This drew forth in cross examination that he favoured Syndicalism but Professor Cannan said he was not at all afraid of it if it was considered as something which may be led up to by a gradual processes. The booklet merits careful attention for the question of nationalisation of coal mines is one of the burning questions of the day.

ACKNOWLEDGMENTS.

Report on the Working of Co-operative Societies in Bihar and Orissa for the year 1918-19. Patna. 1919. Price—Indian, Re. 1; English, 2s.

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The Saving of Irrigation Water in Wheat Growing. Second Edition. By Albert Howard, C. I. E., M. A., Imperial Economic Botanist, and Gabrielle L. C. Howard, M. A., Second Imperial Economic Botanist. Calcutta. 1919. Price 6 Annas.

Report on the Administration of Mysore for the year 1918-19.—Bangalore. Printed at the Government Press. 1919. Price one rupee.

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MYSORE EDUCATION MEMORANDUM.

BY RAJAKARYAPRASAKTHA RAO BAHADUR
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*Inspector-General of Education in Mysore,
(Retd.)*

THE Government Memorandum on Education is such a comprehensive and clear document that it bears the impress of much study and serious thinking thereby rendering the work of critics and reviewers of the memorandum easy. As a member of the Education Committee I took part in the discussions on this subject at its meetings and as the opinions of that committee are now before Government I consider it unnecessary to give my opinion in detail on all points contained in the memorandum.

The essential point to bear in mind at present is that education has come to be regarded as essential for all classes of people for the self-existence and progress of a country.

The ideal now aimed at is to create facilities to develop the physical, mental and moral potentialities of every member of a community to their fullest extent. In the present state of our surroundings with British India pulsating around us with political life and with the prospect of the development of

great industrial concerns it is wise statesmanship to lay down definitely and practically as far as possible for the future the lines on which the education of the people which constitutes the means to enable them to adopt themselves to their newly developing environments and hold their own in the world-wide competition which in spite of whatever is being said to the contrary shows no sign of relaxation. As H. E. the Viceroy observed at the recent convocation of the Calcutta University the present is a time of world-wide readjustment of the older order of things and that among the problems which the last few years have brought into prominence none is more important than that of education. At the same time it should be remembered that we can no longer be content with a mere imitation of western knowledge; but we require means to be found for the assimilation of that knowledge into our mental constitution, so that it may become productive there and not merely lie buried in it.

I do not think that it is in any way of much use to find fault with the growth of education in the past when there is a complete change of the ideal of education as then understood and as now conceived. In all countries the question of providing education to the masses has come into prominence within comparatively recent times and our country has been no exception in this respect.

With these observations I proceed to offer a few remarks on the various proposals contained in the Government Memorandum.

PRIMARY EDUCATION.

I agree that a programme of 10,000 fully equipped and thoroughly efficient primary schools is a generous provision for the next five years. I am not sure, however, whether this programme can be fully worked out within the period indicated. The main difficulties will be those relating to the supply of teachers and of buildings. If a school is not to be opened till an adequate building is ready I am afraid that we shall have to wait very long. Then again if trained teachers are indispensable we must be prepared for a similar length of time. It is to overcome these difficulties to some extent that the grant-in-aid system of 1914 was devised and I am glad to find the Government bearing testimony to its success in stimulating the demand for schools in rural areas, based as the system is on local demand, local efforts and co-operation. Certain evils, however, especially those of inefficiency and impermanency have been laid at the door of this system. But it may be observed that these are evils more or less common to all schools as they are constituted at present. Unfortunately the remedy for these evils cannot be the work of a day even under the new system.

As long as there is no adequate supply of properly qualified teachers and as long as the scale of pay of the teachers is not sufficiently attractive to place them on a level with the pay that they can get in other departments the evils referred to must continue. However the proposals contained in the Government Memorandum for attracting qualified teachers for primary schools and for giving them fair wages are conceived in a generous spirit and will go far in course of time to remedy as far as possible the existing defects.

It is a question whether there should be such a large number as 10,000 departmental

schools, the establishment of which will entail heavy expenditure on State or Local Funds and which will practically act as a check to the enlargement of the grant-in-aid system. I am not in favour of leaving primary schools in the hands of the Education Department for management. Departmental management of a very large number of schools scattered in all parts of the State will not tend to efficiency the teachers being more or less left to themselves and the local people having no power over them, to keep them up to the mark. The departmental inspecting staff will become occupied with a great deal of avoidable correspondence relating to leave, appointments, disbursement of pay and such other matters much to the prejudice of the real work of supervision and inspection. I am, therefore, strongly in favour of taking the management of these schools out of the hands of the department and entrusting it to the District or Taluk Boards or Educational Sub-committees of these boards. It should be the duty of the department to prescribe courses of study, to provide timely and frequent inspection and to provide guidance also whenever needed. The apportionment of cost between Government and District Boards in the proportion of two-thirds and one-third is, in my opinion, well conceived inasmuch as the institutions will continue to bear the colour of grant-in-aid schools.

As regards the length of the course for primary school I am in favour of a four years' course. Even then I fear that a large number will have to be content with a mere smattering. The children in rural schools are not remarkable generally for punctuality of attendance and the co-operation of the parents to enforce punctuality will also be lacking to a great extent. If the primary stage is taken to begin at the end of the fifth year of a child and to continue till about the end of the twelfth year there will be an intervening period of seven years. A large majority of children in these schools

will not, mainly on account of their irregular attendance and to some extent inadequacy or inefficiency of teaching, be able to proceed from class to class within the period prescribed and will necessarily take more years than one. A shorter course than four years cannot therefore help them much to secure that amount of elementary education which will help them to get on fairly well at least in the simple practical concerns of life. Further there is also the danger if released from school too early of their lapsing into illiteracy, the little amount of knowledge imparted to them not having been sufficiently assimilated by their immature minds.

COMPULSORY EDUCATION.

Many of the defects attributed to the Compulsory Education Scheme appear to me to be more or less the outcome of an undertone of injustice done to the rural population by introducing the scheme in the initial stages in the larger places. In the Mysore State, however, I need not say, that the distinction between the urban population and the rural population is very undefined. The existence of a taluk kachery or the existence of a certain number of persons pursuing literary or industrial pursuits or pursuits other than agricultural does not bring a place under the category of urban places. The compulsory regulation has been in operation only from the year 1913 and as education in the larger places on the voluntary basis had developed to the extent needed, the compulsory system was brought into operation first in those places. When compulsion was proposed to be applied to girls in the cities of Bangalore and Mysore, I pointed out at the time that it was the paucity of schools that kept back a large number of girls from attending school and that the real necessity consisted in the opening of more schools for them. However, Government ultimately made the compulsory regulation apply to girls also. I mention this fact not in a critical mood but to express

my agreement with the observation contained in the memorandum that education on the voluntary basis should precede compulsion. From this point of view I fully agree that it is undesirable to extend at once the scope of the regulation to the whole of the State or even to too much quicken its pace. Fortunately the regulation lends itself to its being brought into operation in defined localities from time to time and I therefore urge that as the efficiency of the existing schools is improved or new schools become established in places which have none at present it should be a rule to put the compulsory regulation into force in those places, say, after a period of five years on the voluntary basis. The talk of injustice in the rural population, if accepted, will only mean the imposition of a handicap on those who have had the good fortune of having greater intelligence or of living in larger places conventionally called urban. I am at one therefore with Government in their proposal to bring about 250 more centres during the next five years under the compulsory scheme so as to include all the populous and important villages in the State. The other anomalies referred to as constituting the defects of the scheme are bound to disappear when local control over the primary institutions be established and local people become more and more interested in the maintenance of these schools, instead of the present departmental control, which by the vastness of the task and of the area to be penetrated cannot be as effective as could be wished.

SECONDARY EDUCATION.

The question of a single type of a middle school is a very important one. My own opinion is that if primary schools impart instruction for five years instead of four and the Lower Secondary school course is limited to three years it will be a real benefit to the rural population. A very large number of students of primary schools who complete their education in such schools must be expected to be content with that standard and

are not likely to proceed to a further course of study. In their case, therefore, a five years' course will be much more useful than a four years' course. The middle school may then consist of only three years' course with two more years added of practical instruction for those who have ideas of proceeding to industrial schools to qualify themselves for occupations in life. I am afraid, however, the cost of maintaining a five years' course of primary education may be considered somewhat excessive. If this expenditure, however, can be faced it will, in my opinion, afford a satisfactory solution. English may be begun as an optional language in the proposed highest class of a selected number of primary schools and such of those as wish to proceed to the middle schools can then continue the study of this language for three years in the middle schools they may join. I am not sure if it is desirable to make English compulsory for all students. A very large majority of students are likely to be residents for life of the places where they are born or brought up and a smattering of English picked up by them in their school course will not prove of much benefit. I am not, therefore, in favour of doing away entirely with the Lower Secondary Examination purely in Kannada. In my opinion it should be optional with the students to appear either in English or Kannada. It will not be difficult to arrange for teaching English or Kannada of the standard needed for the Lower Secondary Examination. If Government decide to maintain the existing parallel examination in both the languages the Education Committee may be asked to revise the scheme of the Lower Secondary Examination so as to bring it into line with the new developments introduced. I have not thought it necessary to develop my ideas further here for I find that a single type of school with English as a compulsory language of examination has come to be regarded as affording a satisfactory solution to the existing difficulties. I believe, however, from my knowledge of the past that there will be, a few years after this change has been introduced, a reaction in favour of the voluntary selection of either Kannada or English.

HIGH SCHOOLS.

In the case of High Schools I am very much in favour of making Kannada the medium of instruction but in this connection

we cannot forget the needs of the University courses of study. The institution of the Entrance Examination as the basic qualification for entering upon the University course of study and thereby the reduction of the period of University course for three years is no doubt a wise step, a step taken in advance by the Mysore University long before the Calcutta University Commission made their pronouncement on this vexed subject. I consider, however, that if the University Degree Examinations are not to be considered as the ultimate goal of every school-going student from the time he begins his primary course, it is necessary to make the entrance course one of two years instead of one as at present, leaving the University course in tact as at present as one of three years. This plan will easily enable the introduction of the vernacular as the medium of instruction in the High Schools. Even as matters stand at present those appearing for the University Entrance Examination are found to be considerably deficient in their knowledge of English. This deficiency is as much due to the short period of preparation very much less than a year which they have for the Entrance Examination coming as it does one year after the completion of their School Final course. If vernacular is made the medium of instruction in the High School classes much of the time lost in learning English text-books on subjects other than English language can be profitably diverted for the acquiring of the better knowledge of English as a language. The Entrance course of two years will also be sufficient to enable students who have no idea of entering upon the University course to turn to professional courses of study such as engineering and medicine. The completion of the School Final course will be sufficient equipment for a student to enter upon higher courses of professional training which may not be included in the University courses. For service under Government the passing of the University Entrance Examination may be regarded generally as sufficient for all higher grade appointments without precluding preference to the graduates of the University.

As regards other matters dealt with in the memorandum I generally agree with the opinions contained in the memorandum and I do not deem it necessary to touch upon them here.

HIGH PRICES.

BY GILBERT SLATER, M.A., D.Sc.,

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TO say that prices are high means that much money has to be paid for the ordinary commodities of life. There are therefore two possible causes of high prices. They may be due to an abundance of money or to a scarcity of goods. Similarly a rise of prices may be due to money becoming more abundant than before, and the quantity of goods not increasing in proportion, or to the quantity of goods produced being reduced, while the quantity of money circulating remains the same. It is, I think, easy to see that when high prices are due to a failure of production, as happens in India as the result of a bad monsoon, they represent a real calamity; but when they are merely due to people having more money high prices may—but also may not—be accompanied by prosperity. It is therefore very necessary to find out in any case, when we find prices are rising and seem unreasonably high, which of these two causes is responsible, or whether they are both operating.

Before discussing the present high prices here in India, it will be convenient to consider in brief the course of prices in gold using countries before the war. If we go back a hundred years we find that at the close of the great European war prices were extremely high. That, you will readily understand, was the natural consequence of the terrible conflict in which the Napoleonic empire was destroyed. In the long peace that followed, while there were great fluctuations, prices on the whole were falling until 1848. Then came the great discoveries of gold in California and Australia, which increased the world's annual gold production in five years from about five millions sterling to about

thirty millions sterling, a six-fold increase. As the amount of gold available for use at any time is the accumulation of many past years' production, you must not suppose a six-fold increase in the annual out-put immediately makes a very great percentage increase in the quantity available; nevertheless it does make a perceptible increase, and this effect goes on accumulating from year to year. In consequence of this increase in the world's stock of gold, prices rose steadily from 1850 to 1873 although the production of all sorts of useful commodities in gold using countries was on the whole increasing faster than the population. It is true that within that period there was a series of wars, beginning with the Crimean war (1855) and ending with the Franco-Prussian war (1870-71). These wars did much to check industrial progress and increase of production, and but for them these forces would have more effectively neutralized the increase in gold, and prices would not have risen so much. Nevertheless, in spite of the wars, there can be no doubt that in the leading commercial countries, at any rate, useful commodities were being more easily and abundantly produced after 1871, when prices were so high, than twenty years earlier, when prices were much lower. We can therefore describe that increase of prices as the result of greater abundance of money.

But after 1873 there came a change, and between 1873 and 1896 in gold using countries there were falling prices. The production of gold was falling off. Between 1856 and 1860 it had averaged 6,486,000 ounces, but between 1866 and 1870, 6,270,000 ounces, but between 1876 and 1880 it fell to 5,543,000 ounces, and between 1880 and 1885 to 4,794,000 ounces. At the same time Germany had altered its currency from a silver to a gold basis, other European countries followed suit, France and the Latin Union gave up free coinage of silver, and America also made its money gold money to an increased extent. In consequence there was a great

deal more work put upon the world's gold supply at the very time when the out-put of the gold mines was declining. Also industrial progress, and the increased production of goods and the improvement of transport, bringing all the produce of the world more easily and rapidly and abundantly to the great markets, was continuing, and there was little of importance in the way of wars to counterbalance this advance. It is therefore easy to see why gold prices fell. They fell to such an extent that a sovereign in 1896 would buy nearly twice as much as in 1873 in the English wholesale markets. India felt the effect of this in the falling exchange. This was not due to a fall in the real value of the rupee, for the purchasing power of silver remained very constant in this period, but to the rise in the real value of gold. Howbeit it was very fortunate that the Government of India closed the mints when it did, and fixed the exchange value of the rupee at 1s. 4d., because the purchasing power of silver fell very rapidly after 1896.

Let us now consider the period 1896—1914. This was a time of rising prices all over the world; a time of falling purchasing power of gold; and still more rapidly falling purchasing power of silver. What were the causes of these phenomena?

Let us take silver first. The growth of the world's silver production was remarkably steady right through the hundred years ending in 1914. It was a little under 15 millions ounces per annum from 1821—30; just over 25 millions ounces from 1841—50, over 40 millions ounces from 1861—70, about 100 millions ounces from 1881—90, and over 200 millions ounces for the last decade before the war. But there was no corresponding increase in the demand for silver either for coinage or for other uses. Naturally the value of silver fell. With regard to gold there was after 1890 a fresh rapid jump in production, partly in consequence of the exploitation of the South African mines,

which speedily became capable of producing more gold than the whole world had turned out before 1890, and partly by new processes making the extraction of gold more efficient. Thus the average production of little over 5 millions ounces per annum of the decade 1881—90 speedily became quadrupled. But this unfortunate circumstance was to a great extent neutralized by the people of India. About this time they diminished relatively their imports of silver, and greatly increased their imports of gold, much to the disgust of eminent bankers and others ignorant of elementary economics. By converting into ornaments a great portion of the gold dug out of the ground in South Africa, and pouring forth in payment of that gold vast quantities of wheat, rice, oil-seeds, teas, hides and skins, and other useful commodities, Indians did a great deal to keep down the prices of these things in the world markets, and did a great service to other countries, while making a very poor bargain for themselves.

Besides the increased out-put of gold there was, however, another force operating in the direction of higher prices. Banking was developing very rapidly, and so was the flotation of companies, both new, and to take over existing businesses previously managed by individuals. The shares of companies can be readily lodged in banks and used as security against over-draft, enabling the owner to draw cheques which are, for all practical purposes, money. Thus the gold coin and gold bullion served as a basis for an ever increasing volume of paper money and paper substitutes for money, whereby it was, as it were further multiplied. Hence the effective quantity of money in the world was increased in a much larger ratio than the quantity of gold. The quantity of useful commodities was also, no doubt, increasing, but not so rapidly. The world began to feel more acutely the effect of 'diminishing returns' in agriculture, as possibilities of opening up new areas of rich virgin soil were becoming exhausted.

Let us now consider the position of India during this period. India, like the rest of the world, experienced rising prices, but in an even greater degree. In 1896 Indian prices of necessities were considerably lower than those of the world markets outside India. In 1914 they were still somewhat lower, but the difference was diminished. The movement, which had begun in the middle of the nineteenth century, of linking up even remote parts of India with London and Liverpool, Marseilles, Hamburg and New York, by roads, railways and steamship lines, and the corresponding movement among Indian agriculturists to produce to a larger extent for world markets and to a smaller extent for local consumption, was going on steadily. Between 1904-05 and 1913-14 exports of Indian produce increased 60 per cent, and imports of foreign merchandise (private) 90 per cent. With this greater freedom of movement of commodities there necessarily came greater equality of price of the most necessary commodities, food in the first place, and then clothing, between India and Europe; and this resulted, in India, in higher cost of living, reckoned in rupees, for the masses of the population. And at the same time, as I have shown above, prices in these European and American markets were also rising, and therefore the standard of price to which India was made to conform more and more closely was itself a rising standard. There need therefore be no difficulty in understanding the cases of the rising prices which were creating so much discussion, and to certain classes, so much inconvenience even before the war.

The class that suffered was not a very large one. It included all persons subsisting in fixed salaries, from the member of the Executive to the peon and sweeper. These people received the same number of rupees per month, or even got small increases, but each rupee represented a smaller value, each rupee would buy only a smaller quantity of food and clothing, and pay a smaller propor-

tion of the house rent. Some of these people were well off and could afford the reductions in their real incomes, but it was a serious injury and injustice to the great majority, to the peons, and police, and lower ranks of clerks and many others. Manual workers paid in kind did not suffer, and manual workers paid in money, employed privately, seem to have on the whole increased their money wages in a larger proportion than the rise of prices. Holders of land and producers of all sorts of commodities gained very greatly; but the revenue of Government, while appearing to increase, suffered a real reduction.

If we take India as a whole, there can be no doubt that India profited very greatly by the rising prices of the period 1896—1914. India was a debtor country, and under obligation to pay, in interest, and in pensions and salaries, a definite annual sum in pounds sterling. This sum had to be raised by the export of Indian produce. The lower prices went, the greater the quantity of Indian goods which had to be sent out of the country in order to pay the annual sterling charges. On the other hand, the rise of prices after 1896 continually reduced the real value of these charges and diminished the quantity of Indian goods which had to be sold to foreigners in order to meet them.

India gained still more by another circumstance connected with the rise of prices. One of the causes of that rise was, as I pointed out above, that 'diminishing returns' were beginning to be experienced in the world's agriculture taken as a whole. In consequence the rise was much greater in agricultural products, food, like wheat and rice, and raw materials, like cotton and jute, than in manufactured goods. To take a specific example, the prices of boots and shoes turned out by the Leicester and Northampton factories remained constant. But the price of the leather out of which they were made rose very greatly, while this was

counterbalanced by the cheapening of the process of manufacture. In other words, while the wearer of boots and shoes paid the same price, the share of that price that went to the country producing hides, skins and leather was increased, and the share that went to the manufacturing country was reduced. As India's exports are of the character, mainly, of food and raw materials, and India's imports mainly manufactures, India was getting, between 1896 and 1914, very much better prices for exports, and having to pay only slightly enhanced prices for imports. This is very clearly shown in Mr. Datta's report on the Prices Inquiry.

We now have to consider the war and post-war period. From the very beginning of the war both the two causes of high prices which I have explained, failure of production and increase of money, operated most powerfully on prices in the European and American markets. Millions of men were taken for the fields and factories and enlisted in armies, navies, and administrative services; while millions of workers and innumerable industrial plants were turned aside to the production of munitions of war. The North Sea fisherman still went out to sea, but it was to sweep up floating mines instead of catching fish. That is a typical example of the way in which energy was diverted from production of useful commodities. On the other hand, the belligerent countries gathered their circulating gold into central banks controlled by their respective Governments, and substituted for coin an ever-increasing volume of paper money which they did not undertake to cash in either gold or silver. In this manner, and also in other ways not quite so easy to understand, Governments were enabled to pay out enormous sums of money in wages and salaries and in payment for war requirements and then to borrow again the money they had paid, and pay it out again. Thence there was, side by side, a terrible reduction in the production of the commodities needed

to sustain life, and a vast increase in the amount of money circulating. Necessarily therefore prices rose very greatly. They are now (October 1919) in England about 115 per cent higher than in the year before the war, and more than three times as high as in 1896. Nor does the effect cease with the end of the war. During the war great areas of land were devastated; it will take many years to bring the fields of Northern France into fertility again. The Germans savagely cut down fruit trees and destroyed the machinery in the manufacturing towns of Belgium as they were being driven back to their own frontiers. These cannot now contribute their quota to the world's output. Everywhere ordinary house building has been at a stand still during the war, and even repairs have been reduced to a minimum. The world's railways have deteriorated, through want of rolling-stock, wearing out of rolling-stock, wearing out of rails; roads similarly have deteriorated, and all these subsidiary aids to production demand vast expenditure in order that they may be restored to the pre-war level of efficiency. Worst of all millions of men have been killed, millions more have been crippled for life by wounds or disease, and even those who have come out with but slight injury are jaded and weary, and incapable of working as they worked before. We also have to lament the fact that civil war is now raging in Russia, and the adjoining countries in the east of Europe can hardly be said yet to be at peace. The quantity of money remains as great as ever, and even England and France are still carrying on the business of the State by borrowing. It is therefore not surprising that even higher prices in the European and American markets are expected in this coming winter of 1919 and 1920 than last winter or any previous one.

From the beginning of the war India was gradually more and more cut off from easy commercial communication with the rest of the world. Steamers arriving at and leaving

Indian ports became fewer, and freights very much higher. The total tonnage of ships entering and clearing at Indian ports was 17,386,000 tons in 1913-14, 12,857,000 in 1914-15, 12,152,000 in 1915-16, 11,954,000 in 1916-17, 10,867,000 in 1917-18, and 10,479,000 in 1918-19. As for freights, to take only two samples, in 1914 the charge on rice from Calcutta to London was £1-4-0 in 1914, £15-10-0 in 1918, nearly 13 times as much, and that on wheat from Karachi to Liverpool went up from 14s. 6d. to £12-10-0, more than 17 times as much. One effect of this new obstacle to foreign trade combined with the great and steady rise of prices abroad, was to increase very greatly the prices of all imported goods. But fortunately, the goods that India imports are on the whole much less matters of vital necessity than the goods of home production. For the first three years after the outbreak of war, India suffered some inconvenience, particularly from the shortage of railway stock, but no serious hardship. Until 1918 the seasons were good. Lack of shipping and high freights kept grain in the country which otherwise would have been drained away by the high prices which were obtainable abroad. The export of grain and pulse was 84 millions cwt. in 1913-14, 100 millions cwt. in 1912-13 and 102 millions cwt. in 1911-12. It has averaged only 63 millions cwt. in the five years from April 1st, 1914 to March 31st, 1919. Hence the stores of grain held in India were increased, and this circumstance proved very fortunate when the harvest failed in 1918.

The first serious hardship suffered from high prices came from the cloth famine, which created agitation and riots from January of last year. This was due to the depletion of stocks through import and production combined being less than consumption from the beginning of the war, the scarcity and high prices of imported cloth, and the inability of the Indian mills to increase their production sufficiently to fill the gap caused

by the shrinkage of imports; this inability itself being due largely to the difficulty of importing textile machinery. Later in the year India suffered, and is suffering now, from the failure of the 1918 monsoon. There has been a great shortage of grain, and even greater rises of price, not in grain only but also in milk, ghee, and all other food-stuffs. The Government of India has issued figures to show that the rise of prices in the ports was about 58 per cent up to last April. Allowing for further rise since, and for the probability that since prices in ports have been kept down by the importation of Burmese rice more effectively than prices inland, the general rise must be greater than that in the ports. I think it is a fair estimate that on the average the cost of living in India is now, for the masses of the population, about twice as great as in the pre-war period.

But this rise of price must not be attributed entirely to the scarcity. The effect of a shortage upon prices depends on how much money people have. If the great mass of the people have so little money that they were already spending as much as possible on food before the rise of price, when the shortage comes they cannot spend more, they must just do with less food. But if they have money to spare they will spend more money and try to get their usual quantity of food. If we compare the present condition with bad harvests in the past we can see that the rise of price has been exceptionally great in proportion to the shortage, but the privation and hardship exceptionally small. In other words, both the causes of high prices have been operating together, scarcity of food and clothing, and abundance of money.

The abundance of money in India was the result of the conditions of trade. Great Britain and the allies required Indian goods and were unable to pay for them fully with merchandise. Therefore they paid in money. Export trade was financed by the sales of Council Bills, and the exporters who brought

these Council Bills were entitled to draw rupees for them. They drew so many that it was necessary both to coin vast numbers of silver rupees, and also to supplement them with more notes of the old denominations and with the new one-rupee and two and a-half-rupees notes. From various Government announcements put together I conclude that the coinage of rupees from January 1st, 1916, to the end of August, 1919, amounted to 130 crores. This means that in three years and eight months Indian mints used us in coining as much silver as all the mines in the world have produced in the last five years. Meanwhile the increase in the amount of paper money in circulation was 86 crores of rupees. So you can see that the people of India have a great many more rupees now than four years ago; and that has helped a great deal to make prices rise.

We have now to consider the future. Will prices fall? and if they fall, will they fall to the pre-war level?

Some people are apparently inclined to think that if this season, which has been so favourable so far, continues to be good, and there are large harvests, and Government control of trade in food-stuffs is abolished, that the old level of prices will be restored. If you have followed my argument so far, you will see that this is most unlikely. You will realize that the prices of food-stuffs in the European and American markets will certainly be very high indeed during the next twelve months at least, that is until the 1920 harvest comes in, and even after that only a moderate reduction can be expected. Meanwhile freights are falling and shipping is becoming more abundant, so that Indian produce can more easily be transported to the markets where high prices are offered for it. All this is very profitable trade for the Indian agriculturists, who form the bulk of the population; and it means a great deal more money in their pockets. But it means also a continuance of high prices, if not prices quite as high as at present, at any

rate prices much above the pre-war level. In other words, while we have at present high prices caused partly by scarcity of produce and partly by the abundance of money, we may expect next year, if the harvests are good, high prices due solely to abundance of money.

High prices of that character need not necessarily be a hardship to any one, provided the situation be faced, and all are determined that justice be done to all classes. I think it is a pity that the old custom of payment in kind has been superseded to the extent that it has by payment in money. But employers must recognize that wages were quite low enough at the old prices, and in justice they must, if paid in money, be increased in at least as high a ratio as the rise of prices. Government must recognize the same fact with regard to all its low-paid servants. And tax-payers must recognize that now the rupee has fallen to the purchasing power of eight annas of the time before the war, that if they in future have to pay in taxes two rupees for every one paid then, they are not paying any more reckoned in real values. Professor Geddes well called 'Government treasuries 'Tax-Banks' to remind us that what comes out of them in expenditure must be put into them as revenue and mainly tax-revenue. We must be prepared to pay more rupees in taxes in order to do justice to Government servants.

In conclusion let me point out to you what a magnificent opportunity is now presented to India by the present conditions of the world's trade. Some people in India agitate for political Home Rule. Other people say that what India wants most is Fiscal Independence; the right to determine the amount and nature of the taxes, and make all decisions about the tariff, without interference from the British Parliament or the Secretary of State. Let me suggest to you that India may also aspire to Financial Independence, and ceasing to be a debtor

country, continually paying interest on the foreign capital that provided the railways and irrigation works, and that there is now an unrivalled opportunity for attaining it. I see, for example, that Indian $3\frac{1}{2}$ per cent are quoted at a fraction over £62. That means that for £100 that was borrowed, and received in the form of Rs. 1,500, repayment can now be made less than £63, that is, at present rates of exchange with Rs. 630. Why should not India now raise a great national patriotic loan, to buy up the sterling debt owed to non-Indians, and convert it into a rupee debt owed to Indian investors? I am sure that if the people and the Government work cordially together for this end, it can be accomplished.

We are now passing through a time of scarcity and hardship; but this is also a time of opportunity and hope. Let the opportunities be seized, and in future men will be able to look back at the year 1919 as the beginning of a better era for the Indian people.

In a latter recently published in some Madras newspapers a suggestion was made that the publications of the Agricultural Department should be distributed gratis to land-owners who are likely to take advantage of them. This opportunity is taken to point out again to the public that a list of the available publications of the Agricultural Department can be obtained free of charge by writing to the Publicity Bureau, Victoria Buildings, Egmore, Madras. The list shows the subject of the departmental publications, the price if any charged for them and the language in which they are written. Most of the publications of the department and especially those which are likely to be of service to the ordinary cultivator are available for distribution in the vernacular, free of charge. The public are invited to assist the improvement of agriculture by bringing the above mentioned facts to the notice of the cultivators with whom they are acquainted.

CO-OPERATION IN BOMBAY, 1918-19.

BY "RUSTICUS."

Our remarks in previous years on the dilatoriness of the Government of Bombay in issuing the Annual Report of the Registrar of Co-operative Societies on the working of his Department appear to have been not altogether ineffective for Mr. Ewbank's Report is the first of the Provincial Reports which has come to hand this year. Co-operators in Bombay and elsewhere have reason to regret that it is the last that will be written by Mr. Ewbank for he has recently handed over the reins of office, after holding them for over seven years. It is impossible to praise too highly the work he has done in Bombay. He has piloted the movement in that Province safely through very troublous times and leaves it, if not safely in harbour, at any rate, with every prospect of a prosperous voyage. It was unfortunate that his last year of office should have synchronized with famine conditions over a great part of the Presidency, the effect of which is apparent throughout his Report. Had it not been for the sound work accomplished in previous years, there can be no doubt that the movement would have suffered a most serious set back for famine conditions were accentuated both by the after-math of the war and the influenza epidemic. Where plague had slain its thousands, influenza slew its tens of thousands and over large tracts of country completely disorganized the life of rural and urban classes alike. The war or rather its *sequelae* hit the rural classes seriously as it meant the continuance of railway congestion which kept the prices of imported goods up and those of exported produce down. As for famine, if late rains had not saved the situation in the Karnatak, the South Deccan and East Khandesh, the Presidency would

have suffered a disaster of first magnitude. As it was, famine was declared in the Eastern Deccan and in Northern Gujarat. Even in the southern coast districts which are regarded as immune from famine, the rice crop was exceptionally poor. In Sind, the supplies from the Indus were much shorter than usual. In these circumstances, Mr. Ewbank and his staff, both official and honorary, deserve congratulation on the fact that the number of societies increased by 26 per cent to 2,083, the number of members by 20 per cent to 1,56,805 and the working capital by 26 per cent to nearly 200 lakhs of rupees. Mr. Ewbank frankly admits that these figures have a somewhat deceptive appearance and that the famine and the other catastrophies affected the movement more seriously than they would seem to show. He considers that the condition of the agricultural and lower urban classes deteriorated appreciably during the year and that this deterioration reacted on the co-operative societies and affected both their internal management and outside credit. Whilst there was no diminution in the number of strong and flourishing village societies, the number of weak and untrustworthy societies calling for outside help and attention undoubtedly increased, a state of affairs which should compel advocates of rapid expansion to pause. Mr. Ewbank adds that, in several districts, the unrecovered advances are serious and will take years to wipe off. In these circumstances, it is with a distinct feeling of relief that the reader finds that out of Rs. 73½ lakhs outstanding to the agricultural societies, which make up 83 per cent of the total number of societies in Bombay, only Rs. 5½ lakhs were returned as overdue arrears. In the case of non-agricultural societies, the overdue arrears amounted to Rs. 2¼ lakhs or 6 per cent of the total loans due from individuals. Even though extensions were naturally granted freely during the year, these figures are a striking testimony to the inherent

soundness of the co-operative movement in Bombay. Mr. Ewbank gives an interesting table which shows the effect of the famine on the finances of the District Banks in eleven districts. No less than 84 per cent of the total demand was recovered, 6 per cent was extended and there was default only in the case of 10 per cent. The number of defaulting societies-56-was high but, in many cases, the amounts in respect of which there was default were trivial.

The lines on which the business of the ordinary agricultural credit society should be conducted are now so well established that it is seldom that their working presents any feature of general interest. It is, however, worthy of mention that, in Bombay, the limit of 100 suggested by the Committee on Co-operation as the maximum membership has been found unworkable and has been definitely abandoned. One society for each village has been taken as the working principle, wherever practicable. As for non-agricultural credit societies, the most notable feature was the great extension of the principle of communal societies. These societies have proved specially adapted to the conditions of Bombay where it is difficult to find any better link between members. The recent labour troubles in Bombay which are largely attributable to the high prices and high rents which have made life specially difficult of late for the mill-hands lend special interest to the section of the Report which is devoted to mill-hands' and artisans' societies. It cannot be said that, so far, co-operation has had much effect in alleviating their lot. We are glad to see that the Debt Redemption Committee, whose activities have hardly had as beneficial a result as at one time appeared likely, has set to work again in real earnest and is making efforts to restore the nineteen societies in its charge to a sounder footing and clear off old arrears. The Social Service League has opened a few independent societies and has also founded two Workmen's Institutes in connexion

with the Tata and Currimbhoy group of mills, the permanent staff of which supervise and control thirty-nine societies among the mill-hands of the neighbourhood. The old debts of the mill-hands are not redeemed until experience of their trustworthiness has been gained and advances are cautiously regulated in proportion to wages. Finally, Rao Saheb H. V. Rajwadkar, whose example deserves to be widely imitated, has found twelve societies on a caste or functional basis amongst the labouring classes of Bombay all of which, with one exception, are doing extremely well. But the sum total does not, after all, amount to very much and it is evident that there is a vast field for social service in this direction. The fluctuating character of the mill population is undoubtedly a serious obstacle and there are others. It would have been interesting to know something of the attitude adopted by the mill-owners generally towards the development of co-operative work and whether the example of the Tata and Currimbhoy groups is likely to be followed.

Bombay has done such excellent pioneer work in regard to agricultural societies for purposes other than credit that it is very greatly to be regretted that the famine should have undone so much of the good that had been accomplished. The cattle breeding societies were practically wiped out. The grazing grounds yielded scarcely any fodder and the cost of feeding the stud bulls was so high that they were either starved and became useless or had to be sold. The thirty granaries which give advances for the maintenance of their members (who are mainly from jungly tribes) during the hot weather and make them repayable in kind at moderate interest at the next harvest could not operate in a famine year as, when the harvest fails, they are unable to make recoveries and so have no capital to advance. The short outturn of most crops combined with the shortage of railway transport and

the difficulties consequent on the control of civil supplies made the year a very unfavourable one for sale societies other than those for cotton. The Krishna Canal Society sold $5\frac{1}{2}$ lakhs of pounds of gur and that at Valwa $7\frac{3}{4}$ lakhs whilst the Sirsi Totgar's Society sold about a lakh of pounds of betelnut in addition to a small quantity of pepper. The total sales of all societies were, however, very much smaller than those of the previous year. The twenty-one manure purchase societies sold over eight million pounds of cake, mostly castor and groundnut. These societies are doing most useful work in convincing cultivators of the value of concentrated manures. Mr. Ewbank is anything but hopeful of the future of dairy societies and quotes, in support of his pessimistic opinion, the view taken by Mr. Carruth, the Madras cattle breeding expert, that there can be no improvement until the industry can be put on an economic basis and that the only way to do this is to find a cow that will produce enough milk to pay for its keep and for some profit to the dairyman. It is, therefore, as Mr. Ewbank points out, for the Agricultural Department to take the lead in breeding improved dairy stock. A somewhat unexpected difficulty encountered by the dairy societies was the dishonesty of customers in failing to pay for their milk and it has been necessary to introduce a system of payment in advance. The nine dairy societies handled only 1,819 pounds of milk daily so that there is ample room for expansion. Mr. Ewbank hoped to make a fresh start this year in organizing the collection of milk in villages and its joint transport to cities and retail sale on a larger scale. As in almost every other branch of co-operation in agriculture, the machinery and implement societies suffered severely from the famine which meant that there was no demand for their implements and machinery except in the case of engines and pumps which were badly wanted for the Deccan but,

unfortunately, were not available at reasonable prices.

Mr. Ewbank holds that the Indian Cotton Committee underestimated the usefulness and promise of cotton sale societies as, when the Committee visited the Province, they were in their first year and working under unfavourable conditions. The long list which he gives of the difficulties encountered by the societies would certainly seem to furnish some ground for the cautious view of their possibilities which was entertained by the Committee. In Khandesh, progress was seriously obstructed by the shortage of the cotton crop due to storms, by the absence of outside bidders and combination of local bidders, lack of labour owing to influenza, payments made in currency notes which were cashed at a discount of 10 per cent (surely this could easily have been avoided), shortage of railway waggons with consequent corruption of the railway staff and the fall in the price of cotton due to trade uncertainties arising from the war. In the Southern Division, the difficulty of finding competent and business-like managers was the serious handicap. At Gadag, the auctions were boycotted by the local brokers for ten days until the societies agreed to restore all the obnoxious old cesses and practices still current in the Gadag Bazaar. Appeals to big cotton buyers to send representatives to bid at the auctions evoked no response and the society had to give way. We entirely sympathize with Mr. Ewbank's complaint that the big business firms, whilst frequently complaining of the dishonesty of mofussil cotton dealers, seem very indifferent to measures for putting the market on a better footing. It is to be hoped that the Central Cotton Committee recommended in the Indian Cotton Committee's Report, the establishment of which may be expected before long, will be able to improve matters in this respect. There are now nine cotton sale societies and their turnover during the year amounted to 18½ lakhs of rupees.

Of non-agricultural societies for purposes other than credit, the most promising are the housing societies. Bombay has eight of these and several others will be started in the near future both in Bombay and the mofussil. The allocation by Government of five lakhs of rupees to be granted them on loan should prove a great stimulus to their work. As was to be expected in such an unfavorable year, the weaving societies had a very bad time. We cannot refrain from expressing a doubt whether co-operation, or for that matter, any other measures can place the hand-loom industry on a sound footing owing to the fact that its existence has become an economic anomaly. It is, we think, for consideration whether it would not be well to face the inevitable instead of continuing efforts to bolster up a decaying industry. Stores societies rose from twenty to twenty-nine but Mr. Ewbank says that few of them were well managed and that there is little prospect of development on present lines. He has, therefore, proposed that store societies should be exempted from the official audit, that they should be allowed to deal with non-members and to distribute profits as they like and that a special staff should be appointed to help them in getting into touch with the best wholesale firms and in initiating them into trade customs. The proposals appear very far reaching and we should have liked to know what measure of control is to be kept over the operations of the stores and by whom it is to be exercised. Stores societies are apparently to have an Assistant Registrar of their own with a suitable staff and this may prove sufficient.

In view of the doubts recently expressed by Mr. Wolff in his book on "Co-operation in India" of the likelihood that Guaranteeing Unions will prove a success except in the somewhat special conditions of Burma, we may be pardoned for quoting at some length from that part of Mr. Ewbank's Report which deals with them. He considers that they have two great advantages.

The first is that the system devolves the function of supervision and control from the Officers of the Department into the charge not of a group of urban philanthropists, willing to give up a little of their spare time to the co-operative cause, but of the ryots themselves who are compelled to take a lively interest in each other's societies and soon learn that faulty work in any society within their area reacts on the credit of the whole group guaranteeing that society. The responsibility and power which this system places in the hands of the Committee members has, in many cases, given them a wider outlook and keener interest in their work and is slowly creating a new type of village co-operation into whose hands the controlling power in his own co-operative movement can be slowly devolved without risk of disaster. The second great advantage of the system lies in the grant of a cash credit by the Central Bank to every Union on which it may operate at will. It is, however, a defect of the system that the benefit of prompt and adequate finance thus conferred is liable to be abused by untrustworthy societies. Some Union Committees cannot be trusted to submit to the Central Bank the half-yearly forecasts of their annual needs which are required or to see that the demands are reasonable and that the money is used for the purpose for which it is drawn. Another common defect is the lack of interviewing. It is obvious that societies should not accept liability on behalf of other societies unless they make themselves acquainted with their general standing and their management and this can only be done by sending an occasional representative to visit them. In spite of these defects, Mr. Ewbank holds that Guaranteeing Unions are proving themselves a most valuable and promising development, and that the spirit of progress and neighbourliness which animates the leaders of the best Unions could hardly be bettered. The number of Unions increases slowly because a nucleus of one or two first rate societies and a few really keen workers has first to be found or created. There are now

fifty of them, to which 272 societies or 16 per cent of the total number of agricultural credit societies are affiliated and which control a capital of about Rs. 30 lakhs or one-third of the total working capital of all agricultural societies. The fact that whilst the number of societies affiliated to the Unions is only one-sixth of the total number of agricultural credit societies, they command one-third of the total working capital of all such societies shows that the Unions include the biggest of the societies which is a most hopeful sign.

As we have stated, Bombay has led the way in the development of the non-credit side of co-operation. It has also led the way in regard to propaganda work. Its Central Co-operative Institute was registered on July 13th, 1918, and is intended to serve as an educational, propagandist, research and advisory body, filling a role in India similar to that of the Irish Agricultural Society in Dublin. Its work will be carried on through Sub-committees some of which have already made a good beginning. It is a most hopeful experiment, the results of which should be watched with interest by co-operators all over India. Mention must be made of the valuable training classes for secretaries of societies which were held in Bombay and at various centres in the mofussil and we must not omit notice of Sir Vithaldas Thackersey's generous gift of Rs. 50,000 for the opening of night schools for adult members of societies in villages where the progress of co-operation is hampered by illiteracy. Owing to influenza and famine, a beginning was made under very adverse conditions. Most schools started with great enthusiasm which, however, often cooled down as the pupils felt the strain of keeping their families from starvation and also as they realized how long it was going to take them to learn to read.

We have reviewed Mr. Ewbank's Report at great length but it is a document of such importance that it fully deserves even more space than we have given it. One great lesson which it teaches is the wisdom of continuity of policy. For so long as the co-operative movement needs official help and guidance, "Catch your Registrar young and keep him" should be the motto of all Provinces. He will infect others with his own enthusiasm and only in this way can the band of voluntary workers, without whose assistance co-operation will make no progress, be secured.

HIGHER COMMERCIAL EDUCATION IN INDIA.*

BY P. L. ANSTEE, B.Sc., (ECON.),

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THE first thing is to be clear what end a Commercial College should serve. Is it intended mainly to turn out well trained clerks? Then what we want is an institution something like the Pitmans School in London an institution where shorthand, type-writing, book-keeping, office methods, commercial arithmetic, elementary economics and banking, modern languages, etc., are efficiently taught at hours arranged to suit the convenience of those already in business.

The utility of such institutions requires no discussion. There are many private institutions of the kind in Bombay, some more and some less efficient. But on the whole the opportunities even in Bombay for acquiring a sound commercial education are altogether inadequate. The result is that the great mass of clerks in business firms cannot write clear English, have no idea of time saving devices, type slowly and untidily, and in general reach only a low level of efficiency. There is thus any amount of scope for improving elementary commercial training and much of this elementary commercial training might advantageously be given in the vernacular.

Education in Commerce may however mean something different. Within recent years a number of institutions have sprung up in Europe and America the function of which is to turn out not clerks but young men fitted to rise to positions of responsibility as Managers and Organizers. The idea is to give a liberal education of a university

type on the assumption which experience has amply confirmed, that such an education by enlarging the intellectual and moral outlook ultimately pays in the higher spheres of business no less than it does in professional or official life. But the courses of study for a higher commercial education do not consist of the classical languages, philosophy, literature or physical science. They comprise instead economic history and theory, national administration, public finance, statistics, currency, banking, commercial geography, mercantile law, accounting and auditing. To give a liberal commercial education of this type is the aim of the great and brilliant German Colleges of Commerce, of the faculties of commerce at several English Universities, of the graduate school of business administration at Harvard, and to a large extent of the London School of Economics. Most of these institutions was started in the face of considerable doubt and opposition. But where they were wisely planned and managed, they have long since proved their worth especially in Germany and America.

It was formerly supposed that for Commercial purposes no very high type of education was required. Under the old conditions this may have been true so far as the success of individual traders was concerned though it never can have been true from the national standpoint. The direction of the nation's policy in respect of trade, industry, commerce and banking has always required a wider outlook than is found in those who have learned their business by rule of thumb. And to-day even the management of private concerns calls for faculties of a far higher order than sufficed when competition have not yet become world-wide and when gigantic combines had not yet overshadowed a small trader.

The Sydenham College of Commerce and Economics was founded on the model of the institutions already named. The credit for

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its foundation is due to Mr. Lees Smith, Lord Sydenham and Mr. K. S. Subramania Iyer, formerly Principal of the Commercial School at Calicut. The college was intended primarily to prepare undergraduates for the degree of a bachelor of commerce. The aim was to divert the Indian College student from his excessive pre-occupation with a Law or arts and to turn his thoughts instead to the methodical study of business organization. In this way it was hoped that a new type of highly educated young Indian would come to the front with incontestable claims in the superior posts that have hitherto been confined to Europeans.

The legitimacy of this aim will scarcely be contested. But certain objections to a College of Commerce are occasionally raised as they have been raised elsewhere. The logic of the facts has disproved them in Europe and the United States. Still it is well to examine them.

Old School business men often say "you cannot teach business at a College; no amount of theory is a substitute for practice." The answer to this is that it is not for a moment intended to be a substitute. The lectures and classes do not attempt to replace the concrete experience which can only be gained in business life. Their object is to supplement this experience by a wide survey of the economic organization of the business world.

Similarly others object that courses on foreign trade, the history of economic development, public finance, etc., do not afford practical training. That is quite true. Practical training can only be acquired in actual practice.

In 1917, I got the Bombay University to admit two new subjects into the curriculum, one was 'business methods' including the principles of scientific management, the Psychology of advertising, etc., and the other was the organization of the Indian Cotton trade. These subjects were clearly

designed to serve thoroughly practical purposes. The first aimed, not indeed at the impossible end of bestowing directly proficiency in business management but rather at accustoming students by the analysis of different methods of work and supervision to give their attention to what can be achieved in the way of augmenting efficiency. The aim was to beget in the students the habit of looking after these things and recognizing their importance.

The second course—an optional subject for the benefit of those students interested in the cotton trade was similarly planned on concrete practical lines.

Nevertheless when introducing these new subjects, I stated that it would be a mistake to regard either course as practical in the sense in which that term is employed in speaking of courses by which students of medicine are prepared for the practice of their vocation. I said no courses for the Bachelor of Commerce degree is vocational in this sense. Whatever the bachelors of commerce may have studied at college, the Business men to whom they go for employment will always expect them to start at the bottom on a nominal salary till they have gained experience. This applies to the cotton course as well as to other courses.

Are these courses then without any practical value whatever? Certainly not; the practical benefit of attending them will follow later. For the young business man will be fitted for more responsible and remunerative posts than he could ever have aspired to if his education had remained that of a petty clerk. At the outset of his career he will have to take his place like the rest on the lower rungs of the ladder but later when opportunities of advancement offer themselves he can seize them because his education has made him a man of superior stamp. Without this education a young man is only too likely to be found wanting in the wide information and

the capacity for clear thinking which are essential in the management of modern business.

But to pretend that these courses can lead directly to responsible positions merely excites the ridicule of the business man. The students, if these courses are compared with those in law and medicine, are encouraged to become conceited and to entertain extravagant expectations which are bound to be bitterly disappointed. They should be taught to understand that college courses will not enable them to dispense with the need for actual experience in business. We must lose no opportunity of repressing their self-complacency in the course of their studies.

All the same a bachelor of commerce may even, at the start of his career, be expected to command better pay than an arts graduate. In Bombay, out of the first batch of 26 graduates, 24 secured good positions and 7 began on salaries of Rs. 100. But students should be warned not to consider so much the initial salary as the chances of subsequent promotion.

Unfortunately opportunities for rising in commerce are not unlimited at this stage of industrial development. It follows that in one year there is no scope for more than a comparatively small number of young men with a special training in commerce. It is therefore well that the degree examination in commerce is an exceptionally severe test. Not 25 per cent of those who entered the college have been successful. Such a large proportion of failures implies much misdirected effort. Many of the first students to join the college had no aptitude for business nor commercial connection nor capital; but little by little graduates of a more promising class have been attracted from every part of India. In order to select the most fit, admittance has been restricted and an entrance test has been prescribed.

Yet the number of degree students is probably still excessive. This does not mean that the college should circumscribe its work. On the contrary, it should enlarge its functions by providing opportunities of commercial study for all persons desirous of profiting by them irrespective of their academic standing and position in life. Commercial training should be regarded not as a preparation for examination but as a preparation for life. Any one who is practically or theoretically interested in any particular aspect of business or economics ought to be able to attend a course at the college to suit his special need. This is what the German Colleges of Commerce and the London School of Economics aim at. At these places degree students are a small minority.

Towards this end I have always advocated the admission of non-degree students and the holding of evening classes at low fees, in such subjects as accounting, banking, statistics, commercial geography, transport, etc.

The College might well go further and provide teaching in the elementary commercial studies which, while they cannot form a part of a degree course, are yet of the greatest practical utility. In Europe it is convenient to give the higher type of education in commerce of one kind of institution and the lower at another. In this country it may be desirable to co-ordinate in one great institution all the teaching that aims at promoting commercial and economic efficiency. In planning such a commercial college it must be remembered that it requires ample accommodation in the business quarters of a great city. It requires highly qualified teachers who, being specialists, will demand high pay. It requires a first class reference library containing all publications dealing with commerce and economics, books, pamphlets, reports and periodicals. All this means a considerable outlay which can be incurred only in the

chief commercial or industrial centres of India. To spend money on imperfectly equipped college in smaller places would be mere shortsightedness. I am speaking, of course, of colleges of commerce intended to give education of a University type. Commercial schools may be established at smaller centres, but where there is a college, it should include the commercial school.

Just as the study of commerce shades at one extreme into office training at commercial schools so at the other extreme it merges with the investigation of the higher problems of social economics. For a college that does not provide facilities for original research is incomplete, it will fail to make its students feel that the aim of the teaching they receive is not to pack them with information but to render them capable of independent thought and work. It ignores the obligation binding on all true educational institutions to assist in advancing knowledge as well as imparting it.

Last year the University of London embarked on a new venture in higher commercial education. Perhaps the most striking feature in the venture is the close association of the business world with the University in the enterprise. The scheme was approved at a meeting held under the presidency of Lord Mayor of London. A large general committee was formed, and the syllabus for study was carefully worked out by sub-committees on which representatives from among the best known members of certain selected groups of trade co-operated with the University authorities. The active interest displayed by the business world in this venture combined with the pecuniary support which they have given it is a noteworthy indication of the changed attitude now adopted by business men.

The syllabus for the London University degree has been drawn up with a view to combining general culture with varied preparation for specific ends. Compulsory general subjects, a knowledge of which is assumed

to be essential to every well educated business man are supplemented by special optional subjects selected by the candidate having regard to the line of business he proposes to follow. The first year's course comprises (a) elementary economics, (b) banking, currency, trade, transport and finance, (c) Geography (Indian Universities should observe the prominence now-a-days assigned to the scientific study of this subject), (d) accounting, or world history, (e) a foreign language (it is noteworthy that even such remote languages as Arabic, Persian, Turkish, Malay, and Chinese may be taken) or some one of the Physical sciences. In the two final years the course comprises (a) the organization of industry, (b) the modern economic development of the Empire and the chief foreign countries, (c) commercial law, (d) statistical methods, (e) an optional selected from among the nine groups of subjects.

It is in these groups of optionals that specialization in commercial study is carried to an extent never hitherto attempted. To illustrate there are two trade groups; the first "recommended to candidates for colonial trade," second to those engaged in the trade of a definite area, *e.g.*, Brazil, India, China, etc., then there is an industry group, a public transport group, public utilities group, etc. In each case minute provision is made for the supposed individual needs of the student. We may question whether the teaching carried to such an extreme in the class room is practicable and worthwhile. There is always the danger of the delusion that the college is a substitute for practical experience. But it will be instructive to know what is the result of the experiment.

I referred just now to the material support given to the scheme by the London Mercantile community. Six of the big London banks gave £6,000 each. Many other banks contributed substantially and two big retail shops gave £2,000 each. The Trustees of the late Sir Ernest Cassel fund

gave no less than £150,000 on condition that an equal amount was raised from other sources. Not the least gratifying aspect of the interest shown by the business world in the University scheme is that it brings the scheme into touch with reality. In return for financial assistance the business world has obtained certain measure of control over the teaching of the commerce at the university. It is the absence of control by the business world that makes the management of our only Indian University College of Commerce defective. The Sydenham College is run directly by Government. Conditions in India perhaps make this inevitable but undiluted Government control undesirable because of its aloofness and inelasticity. It should therefore be modified. If any similar institution is founded in Madras I should like you to bear this in mind.

To make the organization of such a college a success we need control through a committee on which Government, the University, and the business community are all represented. These three controlling influences should be brought into contact. As to the details of the work of organization and management I can only repeat Sir William Ashley's advice to put a really capable and energetic man at the head of the institution and then trust him.

The ideal head would perhaps be a highly cultured business man or a man with considerable experience of business or administration, such as Mr. Pember Reeves of the London School of Economics who had formerly had many years' administrative experience in high office in New Zealand. He was succeeded by Sir W. H. Beveridge who had previously organized the labour exchanges in England. It is, of course, rarely possible to get men with such experience as these men had. Failing such men an economist will probably be the most suitable head. Only he must not be the old-fashioned but the new-fashioned economist accustomed to teach economics in a concrete way as Dr. Slater does here in Madras. After all the main body of teaching at the college must be

economics supplemented no doubt by specialised study and taught in an essentially concrete manner but still economics, *i.e.*, a broad survey of economic phenomena and principles in their entirety.

Let me say that I am very glad to hear that you are thinking here in Madras of inaugurating a combined degree in commerce and economics. "Commerce" alone is an unsatisfactory description of the degree. To talk of a university degree in commerce is misleading. Commerce is practical, and the University cannot teach the practice of commerce. It is therefore wise to make it plain that what you aim at is not the unattainable goal of turning out a finished human commercial product nor simply the encouragement of what is commonly taught as economics at the ordinary arts college, but rather a combination of the two—practical and theoretical.

Professor Anstey then expressed himself willing to answer any questions the audience might put in the short time remaining at his disposal. Asked whether a city with 500,000 inhabitants which was the commercial capital of 40 or 50 million people was large enough to be the site of a Commercial College, Professor Anstey said that he would not have wasted his time in giving a lecture on Higher Commercial Education in Madras, if he had not thought it a suitable centre for a College. Professor Anstey was next asked whether commercial honesty would be taught at the College, the questioner making reference to the bad repute of certain Japanese firms. Professor Anstey said that the course at the College would certainly be sufficiently practical to impress on the students that it was a fact and not a mere pious maxim that in Commerce honesty is the best policy. He pointed out that a reputation for honesty was the most important asset of a big firm. There were many large firms which would be ruined if their character for honesty would come into doubt. Students of the Commercial College would soon learn why it was that a big Commercial Firm could much less afford to be dishonest than can a petty trader. Replying to the question whether Commercial Education should be given in the vernacular, Professor Anstey said that he had already pointed that it might be advisable to give the elementary training required for a clerk's post, in the vernacular.

THE WAR AND ITS LESSON.

BY N. SUBRAMHANYA AIYAR, M.A.,

Travancore.

IT will be asked, what is the harm if one nation gets mastery over the whole world? Yes, no harm whatever, provided that that nation has the sense to see, and the self-discipline to realise, that no mastery over one by another, either by one individual over another individual, or by one class over another class, or by one people over another people, can belong to the permanent order of things, and that when, in the circumstances of any particular period, it should *become* necessary, that mastery should be jealously utilised in the interests of *all*. Of course, it will be said that it is quite possible to do so, and it is easy enough to say it. It may again be asked, "have not such world dominions existed in the past?" Yes, they have existed, but they have perished too under misuse. Further, the avowed principle, not the actual principle merely, of German Nationalism is not humanitarian culture. It is militant *Kultur*. Such a *Kultur* will not recognise that every power is a right conceded, tacitly or expressly, by declaration or by custom, and is so conceded as an equipment for shouldering responsibility. It will will to power without willing to be responsible for those over whom that power is to be exercised. Such wills have always failed in the history of the world. Power must be a power to do good to all, though of course including self. If power is construed and worked in any other sense, it will not take long for the right conceded to be withdrawn, and for the power, once allowed to be exercised, to be repudiated. It will all go like a house of cards. It is situations of this kind that will happen if, with the genius of civilisation as represented by German *Kultur*, left unhumanised, or left unspiritualised, by the

influence of real culture, a nation revelling in the heyday of economic prosperity, and having science with its daily, rather minutely growing possibilities, harnessed to its chariot, is allowed to sweep over the world's main, unchecked and free. Here lies the moral victory of having laid Kaiserdom low.

True, this war—emphatically a war of the world's self-defence—has raised a number of side issues. But they will all get solved sooner or later. The League of Nations, it is fervently hoped, will not merely *leave* free, but *enable*, each nation, weak or strong, to develop on its own lines and to the best interest of self and of humanity at large. The policy of future statesmanship is going to be the giving up of the programme, or rather the no-programme, of merely "adjusting" oneself to the conditions as they arise from time to time, without any idea of a goal, or any consideration of the questions whether the conditions sought to be "adjusted" to are really the intermediary stages in the march towards that goal or are but the effects of some wrong steps previously taken, what further "adjustments" as they are wrongly, though euphemistically termed, would again be called for, and what would be the logical termination of these interminable "adjustments," to continue the euphemistic expression. The policy that is evidently going to be adopted is to cease trusting in these so-called "adjustments," to formulate a definite goal for both international and intranational relationships, and then devise a scheme for working up towards it, intensifying the forces that are operating in the direction of the goal, retracing in a spirit of mutual sympathy and good fellowship the wrong steps, if any, that have been taken in the past, and correcting the resultant wrong conditions. In fact, this march towards a goal is along progress. But if it should be not to change merely, but to progress, we must know whereto we are moving, from where we are moving, *i.e.*, we must have

clear ideas of the starting point and the goal. Then alone can we measure the rate and degree of such progress. Then alone can we make any real *adjustments*. Else, the movings may only be struggles to get out of one difficult situation miscalled "adjustments" only to be landed into another or perhaps still more difficult one. If individuals and nations, then, initiate and change policies with such definite ideas of a starting point and a goal, our life-history would not be the history of unremitting, pious desires, ever *to be* accomplished, with a clear plan of operation, on the other hand, which, along with starting point and goal, must form the trinity of all human endeavour, man *shall be* blessed and not merely *would be*.

And what is that goal, let us ask, but the goal of securing unity in the midst of all the world's diversity? This is no impossible task. It may be dubbed, of course, by easy going critics, as "a counsel of perfection," and condemned on that account. But is perfection such a dreadful hobgoblin to be so religiously shunned? Is it not the want of a clear plan whereby to reach an ideal that has made all great ideals look impossible? This is what thinkers of all ages have tirelessly proclaimed. In fact, there is nothing like "impossible", given a clear plan of operation, a united will to work it, and no morbid craving for immediate success. Following on this cult of "the impossible", there is the equally false cult of "the practical man", who is taken as one *opposed* to "the man with an ideal" instead of being regarded as his *complement* and necessary *instrument*. To the man with the ideal, a century seems no great while to wait for the result of a great project. But to the so-called "practical" individual, who is, more often than not, a mere opportunist, who is more an accomodator to a casual condition than an actor in pursuit of a fixed aim, in other words, to one whose highest diplomacy is to escape from the embarrassment of the hour, if a scheme is not at once successful and benefi-

cial or, ~~is~~ not sure to be, it has either failed, or is beneath notice. Popular applause will in doubt drench him like a summer shower, as the average man is more short-sighted then long, but leave the seer severely alone, if he is not positively misunderstood. Though perhaps such is the irony of fate in this post-adamite world, these two cults, I have no hesitation in saying, have been the variest curses to human progress. The marital tie, for example, which is the most familiar instance of two individuals, diverse in form and structure, being knitted into one, is, we know, the closest and the most intimate tie of which we have any conception in human relationship. For that matter, difference in race or language, status or religion, dress or department do not at all signify, provided the will to unity has been engendered. And what is that tie that keeps them together but the tie of mutual helpfulness, the tie of service-exchange? What is possible thus in the family of the sexes may it not be equally possible in the family of nations? Only a similar relationship will have to be established. The world will have to be "wedded" to such a relationship. A life of isolated living is outside the question. It is now no more possible between nations than between individuals. There *must* be, and *will* be, some connection. Let that connection be not only unharmed, but actually helpful.

For this purpose trade and economic relations generally should be most carefully regulated. Producers in a country, whether of material products or mere services, should be able to exchange with each other in a manner that will not prejudice the interests of any. By natural aptitude or by long practice, it may be that certain people are better fitted for doing or producing certain things than others, and may be still employed in doing them. Our duty should be to buy of them those things, to invest our savings with them and thus help their continued production in increasing quantity and quality.

The same should be the policy between nation and nation. There may be certain industries for which certain countries have either the natural facilities, or have acquired special fitness, or both. Every other country should buy those products of *them*. Through a policy such as this, every individual and nation can get the best out of every other individual and nation in the cheapest and easiest manner, and a spirit of mutual interest will grow. On the other hand, every country trying to produce everything, like every person trying to supply all his wants or producing whatever he chooses without any idea of co-ordination with what others produce, can only lead to confusion and inefficiency in the things produced, and can only lead to strife and irresponsibility as between the producing units. It certainly cannot lead to progress or harmony. Further, international unity and universal brotherhood, we should note, will never come about by merely saying, "Go to now, let us be united." The originator of the international language "Esperanto", has formulated his principle that the feeling of separateness and even dislike of each other, which men and nations may feel, will *not* disappear from the face of the earth *unless* humanity has but one language and one religion. But actual observation does not show that peace and concord are the necessary accompaniments of oneness in faith or tongue. Responsible interdependence just as between the sexes in a family is the only open-sesame to peace and solidarity to which there is no other royal road. For, do we not see before our very eyes that fighting rivals for a common patrimony or some material interest are the greatest enemies to each other, worse even than fire—their common parentage, their common language, their common religion, their common traditions and their freest comminglings notwithstanding? When interest separates, what else can cement? To make the interest of self accord with the interest of others has there-

fore been the real problem in all ages and climes; and nowhere can this problem be satisfactorily solved, either as between individuals or between nations, except by a system of established service exchange, whereby one serves self *through* serving others, and establish I would say, not in an objective relationship merely, but also in a subjective realisation of the need for such relationship and of the responsibility for maintaining it in full force. If sin is evil, and if evil, is harm to fellow-creature, this can be the only key to the problem of sin and evil in this universe; this is the bed-rock upon which the church of the world's universal religion shall stand vindicated for all time.

In the light of all these reflections, it is comforting to observe that the march of post-war statesmanship is in the right direction. I am one of those that have the fullest confidence in the League of Nations. Recognising, as the League does, that economic peace must precede political or military peace, there is no excuse whatever for looking on it askance, as some seem to do. For my part, I look upon the League of Nations as the League of the world's Guardians and Protectors. Whatever may be its initial difficulties and they *must* be great in view of the Herculean task it has undertaken which is no less than the task of spiritualising humanity it cannot, under any circumstance, stop short of completing its sacred mission.

The *Peradeniya* is an interesting magazine of the School of Tropical Agriculture, Peradeniya, Ceylon. It provides space for old students to record their experience with the land, and the results of their observations and investigations. The number for December, 1919, contains three articles written by or based upon the investigations of old students. We hope that both past and present students will make a fuller use of the opportunities thus afforded to them. We wish the journal every success.

THE DEHRA DUN BOARD OF FORESTRY, 1919.

BY A. P. SMITH,

Deputy Conservator of Forests in Travancore, (Retd.)

THE proceedings of the Board of Forestry at a meeting held at Dehra Dun, between the 31st March and 8th April in the current year, are unusually interesting; not only because of the definite strides made in Forest progress for some time past, but for the (1) summary of facts on which proposals for improvement are based, (2) the future management of forest working, (3) the staff required in the Imperial and Provincial Services, (4) the new measures to be adopted for new demands in forest Industrialism, (5) the great and pressing need for research, (6) an alteration in business office methods, and (7) lastly, the new light received from the demands of the war. The Hon'ble Sir Claude Hill, the member in charge of the Department of Revenue and Agriculture, opened the proceedings in an encouraging speech in which he referred in appreciative terms to the useful nature of the Board meetings as affording opportunities for the interchange of ideas between officers in the various provinces. He thought that the meetings which had been held hitherto every three years should be held more frequently because of the development of provincial autonomy. Sir Claude Hill paid a tribute to the Forest officers who joined the army during the war. Their absence threw much additional labour on the staff which was the poorer by their departure. The Hon'ble Member laid much stress on the great importance of research work and the need for expansion in that direction, dwelt on the educational facilities in connection with the recommendation of the Public Services Commission, the employment of Indians in the higher branches

of the Forest Service, the creation of a special staff of Forest Engineers and the necessity for the co-ordination of processes of work, and for public advertisement.

The Inspector-General of Forests, Mr. G. S. Hart, C.I.E., delivered a most interesting address in which *inter alia* he informed the meeting that most of the local governments had recognized the value of possessing a special Forest Engineering branch in connection with forest operations. The Government of India sometime ago deputed Mr. Leete to study the Forest Engineering methods in vogue in America and Canada and Mr. Leete has submitted a very valuable report on the subject which has resulted in the Government of India writing to the Secretary of State to obtain the services of two Consulting Engineers from America for two, if necessary for three years, and these officers are to offer advice on Forest Engineering problems and help, in starting on right lines, a dozen or so of junior Engineers who would be distributed amongst the provinces, after a period of special training. In educational matters too the outlook was brighter, as the Government of India in accordance with the recommendations of the last Board meeting had given two Instructors and two Assistant Instructors for the Provincial Service Course, who, together with the research officers delivering short courses of lectures in their special subjects, would be able to maintain the standard of instruction at a high level. But this was not enough for each of the large Ranger classes needed an Instructor and an Asst. Instructor, to keep forest education at an efficient level. The war had interfered with the decentralization of the training of Forest Rangers, but from this year 1920 onward Ranger students from the Central Provinces, Bihar, and Orissa and the Central India States will receive their training at the Coimbatore Forest College and this arrangement would permit a greater number of students from the other provinces attending Dehra Dun,

And when the Bombay Government constructed the proposed Dharwar Forest College the scheme of decentralized training would be more or less complete. The Inspector-General observed that, it was whispered that the Department, as a whole, did not know very much of the work done by the Research Institute, and he proceeded to summarise the progress made, from which it will be seen that indubitably valuable results had been achieved. For instance, in the Chemical branch the investigations comprised the discovery of tanning extracts, the distillation of turpentine from Indian pines, the chemical properties of Japanese lacquer varnish as being identical with the natural varnish of *Melanorrhæa usitata*, the manufacture of thymol from "Ajowan" seeds which is being turned out at a factory in Dehra Dun, in considerable quantities, and the manufacture from the gum resin of *Boswellia serrata* of turpentine, rosin and gum were some of the results obtained. Some 57 minor investigations, and reports had been published and this out-put was most creditable to the small staff at work with the inadequate equipment available. In the Zoological branch, research had been practically confined to Entomology and though some general work had been attempted, specialization was not possible. Mr. Hart declared that the most productive methods of investigation lay in the consideration of the forest as a biotic association of plants and animals, and in the treatment of insects from an aecological standpoint. A consideration on these lines revealed the fact that the Indian forests are not subject to epidemics under normal conditions, and that the conditions favourable to epidemics and the evolution of new primary pests may be created by the establishment of pure plantations and uniform forests. In the Botanical section much educational work had been accomplished, especially in the direction of soil aeration as a potent factor in influencing plant growth—a fact which was first brought to notice in

India by a Forest Botanist. In silviculture, a considerable advance had been made from 1910, but future progress in silvicultural research depended mainly on the extent to which the work could be decentralized. The "ideal", said Mr. Hart, "is for local silviculturists to work in different provinces, with the Research Institute at Dehra as a central agency for co-ordinating their work, recording results and distributing information." In the Economic Section the first inquiry was in connection with the manufacture of matches; next followed the antiseptic treatment of timber, the value of bamboos and grass for paper pulp, pencil making and paving blocks for roads. With regard the last Bombay had indented for more blocks which Calcutta found to be unsuitable. The distillation of Rosha grass oil for which a company is prepared to erect steam mills, and the general investigations relative to the utilization of timber which are at present not on the market are being pushed on. From a financial point of view the results were satisfactory. We quote as follows:—"The financial results of the Department have again improved considerably. For the year ending 30th June 1915, the Revenue, Expenditure and Surplus for British India as a whole, including Burma, were Rs. 2,97,00,000, Rs. 1,82,00,000, and Rs. 1,15,00,000, while for the year ending 3rd June the corresponding figures were approximately Rs. 4,22,00,000, Rs. 2,12,00,000, and Rs. 2,10,00,000" The demands of the war were responsible for the increase in revenue. Mr. Hart declared that though the general average was low they indicated the possibilities of very great improvement. The conditions in India were very unfavourable compared with the income derived in Europe from the forests, owing to the lack of adequate means of communication, the inequalities of forest growth over large areas, the crude methods of extraction due to the want of mechanical appliances, etc. That there are great possibilities is indicated by the return of the teak

plantations at Nilambur which yielded a net return of 42'4 per acre per annum. Adverting to the recommendations of the Public Services Commission and recruitment, the Inspector-General expressed the opinion that it was certain that, in future, the Imperial branch of the Forest Service would contain a considerable and increasing proportion of Indian Officers. Indians had generally preferred to compete in the Civil Service, the Public Works Department and the Imperial Medical Service. The British Officers of the Department were prepared to welcome Indians of the right kind. After touching on the importance of concentrated work in sylviculture in Forest development, Mr. Hart said it was important to put back into the forests a fair proportion of the revenue derived from exploitation to secure the success of regeneration mainly by artificial measures. There was no reason why India should import timber of any kind for any purpose whatever. It was his belief that, in course of time, India should be a very large exporter of timber of many kinds, instead of the best quality of teak, which, at present, forms practically all the timber that leaves India. To achieve this it was absolutely necessary for the Government to do pioneer work by establishing saw mills, drying kilns, the necessary staff on adequate terms, and to sink the necessary capital in development. Government were chiefly the proprietors of the Indian forests and if concentrated work on the right lines were carried out the future prospects were extremely promising, while the forest Estates of Government would be many times greater than they are at present. There were discussions on technical subjects and a most interesting, instructive and suggestive paper on the future of Forest Colleges. Mr. Tireman, Deputy Conservator of Forests, Coorg, in a memorandum, offered some suggestions regarding a large and immediate increase in the establishments, of the Imperial and Provincial Forest Services. Mr. A. T. Gibson, Deputy Con-

servator, Panjab, detailed a description of the reforms necessary on Business Office Methods in the Department. "The Indian forest officers had to try and combine a maximum of outdoor work with an ever increasing burden of office work." Many of the methods and processes in use "were," he said, "not required or inefficient. There was much intermediate handling of papers before they got to the actual disposing authority, and the sum-total of the whole arrangement was that highly trained and highly paid officers were kept at their desks unnecessarily, while important constructive work, expansion schemes and work calling for expert knowledge was delayed."

One of the most noticeable papers was contributed at the meeting by Mr. W. Raitt on "New Measures for New Demands in Forest Industrialism." Mr. Raitt claimed to speak from experience gained, as he said, "on both sides of the counter." He had been semi-officially connected with the Forests Department for 8 years, during which period he had had opportunities of closely observing Government and Departmental methods of dealing with the trade and commercial side of forest work. Previous to his connection with the Department Mr. Raitt was closely associated with the Commercial and Industrial Community; and the conclusions he formed from both experiments was that a complete change was necessary on the part of the Government and the Department, more especially the former, if the Industrial development of forest produce was to achieve any success. Mr. Raitt declared that there was an extraordinary eagerness on the side of captains of industry to avail themselves of opportunities—to do business with the Department were it not that the "chief obstacle to commercial development has been the Government." In dealing with Government, industrial men were anxious to know "how to circumvent acts in restraint of trade committed by the Government." One Calcutta merchant had told him, "If we can get

what we want anywhere else in the world, or find any one else in the world, we should never ask a British Indian Government for it!" Again an eminent Civil Servant of much experience in handling commercial matters and one free from official prejudice, and tradition said to Mr. Raitt:—"The truth is we are all so desperately afraid somebody is going to make money out of us. Here we have a case of a man who has the pluck to pioneer a new industry for us and we are at once set to work to plaster over his agreement with notes and amendments and hedge it in with instructions until he throws it up in disgust—and serve us right. My view is that such a man should be grappled to our soul with hooks of steel and that we should do every thing that in us lies to ensure that he makes heaps of money. The more he makes the bigger advertisement for our goods, and the greater the price that we can get from the next man. After all, the money we are so terrified he will make will not be our money. It will be his own made by an act of creation out of what is now perfectly useless material." Mr. Raitt said "that the head and front of our offending is the exasperating, paralysing and petrifying slowness of Government procedure." He deplored the *autocratic monopolistic* attitude adopted by officialdom in India.

These remarks of Mr. Raitt are as significant as they are true. Red tape, the rut of *manul*, the lack of business perception, the ignorance of industrial and commercial methods, a conviction that Government is omniscient and is doing for the Indian people all that is essential and wholesome for their welfare and, lastly, a supreme disregard of the conditions necessary for rehabilitating and reconstructing the industrial side of Indian life in view to competing with, and ousting, the vested interests of English manufactures have all resulted in almost the complete destruction of Indian craftsmanship and the indigenous industries, and have made

this country dependent on foreign goods manufactured from her own raw products to the enormous loss of the people and the Government.

The whole of the proceedings, if carefully perused, should give the Government of India occasion to alter their business methods in order to adjust them to the new demands which now call for urgent response. In Native States as well, there is too much red tape and a great absence of business capacity in the officials vested with authority to commercialize forest produce and to encourage private enterprise. Year after year, we read in the administration reports that great quantities of timber in the forest depots remain unsold because there was no demand. There would be a demand if private enterprise were encouraged and facilities granted to men willing to spend their capital with the prospect of obtaining a good return. It was pointed out that there is nothing in the forests of India which cannot be duplicated and supplied by other countries in abundance, and if Government would only pioneer Enterprise great results would be achieved in India. The Industrial Commission recommendations are about to be considered and given effect to as far as possible; and we trust that that "possible" will not be limited and endangered by restriction, red tape and indifference in giving effect to India's enormous resources in raw produce which forms a mine of wealth which should be worked and developed in India's interests and not left to foreign exploitation. At present, India suffers deep financial loss which keeps her people poverty stricken and solely dependent on her agricultural produce such as it is, and foreign manufactures of her own produce.

ECONOMIC CONDITIONS OF SOME OF SOURASHTRAS OF MADURA.

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THE present study is a section of a larger work on an Economic Survey of the interesting Sourashtra Community of Madura, which the writer has made, and deals with war influences and present economic conditions.

In normal times the dyeing and weaving industries of the Sourashtras have just been able to make a bare living, but when famine has come or any great national crisis, the Sourashtras of Madura have always had an anxious time of distress and actual want.

When the Community was overtaken by the great famine in 1876-77, its resources were crippled to such an extent that its trade was considerably affected, and its people suffered want. But the paternal Government gave it looms, and took other steps to see that it was not wholly impoverished.

The Sourashtra Community in Madura had another trying time in 1898, when it was forced to make application for Government relief. At that time out of about 15,000 persons who were engaged in weaving or dyeing half of them were suffering from want and loss of their usual employment. In their memorandum to Government they state that the distress under which they suffer has been caused by:

(a) the existence of famine in the northern districts, *i.e.*, Ganjam, Vizagapatam, Godavari, Kistna, Cuddapah, and Bellary, and the fall in the export of cloths from Madura in consequence.

(b) the substitution of machine-made cloths in lieu of those locally made.

(c) the fall in the prices of yarns.

(d) the substitution of aniline-dye-powders for the more durable dyes locally manufactured, and the elaborate method of country dyeing.

Take the export trade of Madura Weavers about that time. Venkatachalapathi exported Madura cloths to Guntur as follows:—

		Rs.
1896	export reached	44,384
1897	"	15,699
1898	a famine year	nothing.

Ramiah Bhagavather exported Madura made cloths to Rangoon as follows:—

		Rs.
1896	exports reached	22,987
1897	"	17,544
1898	"	12,888

Similarly, the exports of the Somalinga family fell from

Rs. 32,369 in 1896, to
Rs. 24,224 in 1897, to
Rs. 1,958 to 1898,

Take the details of wages in 1898 in Madura as the result of famine conditions in the North:

1. Process of oiling-mixing with oomari ashes previous to dyeing:—

Wages for such work 2 to 2½ As. per day in 1898. Five years previous, the wages were 4 As.

2. Dyeing:—

Wages in 1898 were 4 As. Five years previous they were 6 or 7 As.

3. Weaving superior counts:—

Wages in 1898 were 5 As. Five years before they were 10 As.

4. Ordinary weaving:—

1898 wages were 3 to 4 As. Five years before 8 As.

5. Process of Sungudi done by women:—

1898 wages were 1 Anna or 9 pies, five years before 2 or 3 As. were paid.

From the above, it will be seen that famine wages are only half of what people get in normal times. On account of these things, together with the lack of technical

training and the lack of adaptations to modern improvements, weaving and dyeing have lately become unprofitable to trades and in consequence many members of the community have given up their hereditary occupation.

The last and hardest shock which came to these people was in 1914 when suddenly and almost without warning the whole world was thrown into confusion by the beginning of the Great War. The Sourashtras, having become accustomed to German synthetic dyes, and having lost the art of manufacturing their own dyes, with the prohibition of foreign enemy imports found themselves absolutely without dyes. The price of the small quantity of dyes which happened to be in stock jumped immediately from Rs. 60 to Rs. 600 and more. Even that supply soon became exhausted and the dyeing factories were closed, the dyeing yards were vacated, the people had to do cooly work for a bare living and to this day we do not know how the people managed to exist. For the duration of the war, the dyeing and weaving trade in Madura was practically killed.

In 1918, the Indian Government was able to secure small quantities of dyes from the British Dyes Company and these pittances were sold out to *bonafide* Madura dyers in seven pounds parcels under the direction of the Collector and the Dye Expert. Even as late as June, 1919, things were not much better and a meeting of the dyers of Madura was called to consider and decide on a larger and more impartial distribution of alizarine dyes to the dyers. The dyers complained that only a few, not more than four or five, had been given tickets for 56 lbs. of dye stuff, another four or five had been given tickets for 28 lbs., but the generality had only 7 lbs. and 14 lbs. a month. The people were very disappointed at being given so small a supply, and said they cannot earn a living wage with this quantity. Most of them have a stock of mordanted piece

goods and by the time that they get enough dyes to dye they feared the mordanted goods will waste away, if they do not actually catch fire.

But more dyes are being obtained, and it is a pleasant sight to see the dyeing houses being re-opened, the yards being filled with drying yarn, and the returning activity of an industry which has been for many years a closed business. Mr. Tulsiram in June, 1919, went to England among other things to see if he could obtain a much larger grant of dyes for Madura. The Madura dyers need 300 tons of alizarine every month, and Mr. Tulsiram promised to try and secure that amount from the Board of Trade.

The period for reconstruction will undoubtedly bring with it many problems and difficulties, but if the Sourashtras of Madura will realise that we have entered into a new world after the war and will determine to train themselves and their industry for and adjust themselves to the new conditions in this new age then I firmly believe that there is a future for the hand weaving industry in the city of Madura for many years to come.

Mr. (now Sir Alfred) Chatterton amply bears out this conclusion. He says¹:—

'In the meantime the evils arising from the lack of suitable employment must be checked, and a system of industrial development devised to deal with the existing state of things. Enterprise on a grand scale can be left to grow in the manner it has done during the last half century and at present need not concern us. Our attention should be concentrated on the decaying indigenous industries; hand-weaving, working in metals, tanning and leather manufactures and all the petty industries which supply the simple needs of the people. Labour must be trained to work more efficiently, there must be less of brute force and more of skill, the primitive tools of the artisan must be superseded by better implements; sub-division of labour must be introduced and from the crude simplicity of each family as a unit of productive effort strong combinations must be evolved either by co-operative working, or by the concentration of manufacture in small factories. That this can be done there is not the least reason for doubt.'

¹ 'Industrial Evolution in India,' by Alfred Chatterton, Madras, 1912, page 15.

The Indian Industrial Commission's Report likewise comes to the same conclusion. It says² :—

'There is no likelihood of cottage industries becoming extinct; but improvement in the condition of the workers is not probable, unless better tools and plant are employed and an intelligent sub-division of industrial processes introduced. There is a tendency, which will probably be accentuated, to organize small factories, and this should be encouraged.'

In order to arrive at more or less accurate information of the present economic condition of the Sourashtra Community, I prepared a questionnaire on the subject. The questionnaire was submitted to Mr. L.K. Tulsiram, one of the leaders of the Sourashtra community in Madura, and he very kindly gave his sanction to its being carried out. He also promised to help me in the economic survey, and his Head Clerk has actually helped in the gathering of the information required. Then the Chairman of the Municipality, Mr. V. Srinivasachariar, was asked for permission to be allowed to undertake an economic survey of some Sourashtra families in the First Ward of the city. Permission was readily given, and the work was begun.

The following is the *questionnaire* which was submitted to people :—

Name
 Number in family
 Children in school
 Do you favour technical training
 What is your occupation
 Have you changed your occupation
 Why did you change
 Do you do any cooly work
 Why do you do cooly work
 For how much time in a year do you do cooly work
 Present monthly wages of weavers
 Present monthly wages of dyers
 Present monthly wages of :—
 Cooly man
 Cooly woman
 Cooly child
 Where do you get your yarn
 Where do you get your dyes

Which are better, German or English dyes
 Why are they better
 What is the price of yarn to-day
 What was the price before the war
 What is the price of dyes to-day
 What was the price before the war
 To whom do you sell your finished cloths
 What is the average price you receive for cloths to-day
 What was the price before the war
 Would a large weaving factory established in Madura hurt your business
 Have you a Weavers' or Dyers' co-operative society
 Do you wish to have one
 What do you wish in order to improve your cottage industry
 How has the war affected your business
 What are the future prospects of your business
 What is the bazaar price of rice to-day
 What was it before the war.
 Family budgets :—

Monthly income
 What is the total monthly income of your family

Total

Monthly expenditure :—

For rent of house
 For clothing
 For food
 For other necessities
 For Religion
 For extras, as marriage or funeral or other social customs

Total

How much do you save in a month
 What do you do with your savings
 What is your greatest need in order to improve your economic condition

As you will observe the questions are grouped around the following subjects about which information was especially desired : education, wages, prices now and before the war, the influence of the war, family budgets, and needs in order to improve economic conditions.

The average number in the family is five. Many families have no children in school, a few families had only one child at school. The reason is the parents have no great appreciation of education, and the work of the children is required to swell the

² Indian Industrial Commission Report, 1916-18, page 196.

family income. Do you favour technical training? A few said—No. Some did not know what technical training meant. The majority, however, said—Yes. One man said—‘Yes, I want to educate my sons on that basis to a great extent.’ What is your occupation? The large majority said—Dyeing, Weaving. Women tie knots in cloth for dyeing purposes. Several said their occupation was ‘dyeing,’ and from their economic one could easily conclude that might be true.

Have you changed your occupation, and why did you change? The purpose of these questions was to find out if any had been forced out of their hereditary work on account of economic conditions. It was found that a number had changed, but very few to any work which is considered beneath their dignity, though they could make far more money at it. Many would sooner eke out a miserable existence than make a change. One man said however—‘Yes, from weaving to dyeing. Because in weaving I will have to work from morning to late in the evening and the wages I get from such work can scarcely maintain the livelihood of my family. I cannot save anything and if any sudden expenditure comes I will have to borrow money from others at high interest and mortgage my house.’ Another man said: ‘Yes, from weaving to selling rice, brinjals, oil, salt, and other household requirements. I found out that I could save nothing by weaving, so I opened a small shop to sell sundry articles. But later, seeing that this business is somewhat troublesome and I will have to sit in the shop from morning six o’clock to ten or eleven in the night, I again undertook weaving business which requires less time, from 8 a. m. to 5 or 6 p. m.’

Some are doing cooly work, and during the war many were forced to do cooly work or starve.

The wages of weavers, of course, vary according to the speed of the weavers and the

quality of work turned out. Some make Rs. 15 per month, others Rs. 18; turban cloth weaving which requires two men, each earns Rs. 22 or 23 per month. Dyers make not less than Rs. 20 per month.

Present monthly wages		Before the war	
		A. P.	
Cooly man	.. 8 to 12 as.	6	0
Cooly woman	.. 4 to 5 as.	2	6
Cooly child	.. 2 to 3 as.	1	9

Yarn is procured from Madura dealers. A common practice is for a merchant to advance the yarn and receive the finished cloth, for which he pays the weaver a regular rate for cloths furnished. As one man says: ‘From the merchant under whom I am only a weaver.’ There is a great and needy field here for co-operative effort. Dyes are obtained from Madras or Madura dealers, except during the war when the scant supplies were under Government control and distribution. German dyes are generally regarded as better than English, because the supplies were regular and cheap before the war. One answer was ‘because in the German days the chemicals added are better and it is fast and more shiny.’

The price paid for yarn to-day is—Madura Mill yarn No. 20 Rs. 13, dyed yarns Rs. 19. Before the war the price was Rs. 4. The price of dyes to-day is: one rupee nine pies per lb., or Rs. 475 per cask; before the war the price paid was six annas per lb., or Rs. 120 per cask.

The very important question—would a large weaving factory established in Madura hurt your business? brought out the general answer ‘undoubtedly it would’, and one man said, ‘we would not be able to do any other work.’

There is a Madura Sourashtra Co-operative Society, but it is spending its energy mostly in connection with the problem of dyes supply. The protection and organization of the weavers is urgently needed, or they will not be able to compete with the

factory. What do you wish in order to improve your cottage industry? Some of the answers reveal the fact that some people at least realise what their business needs in these new days of reorganization and competition. We need technical training; higher wages; assured supplies of thread, silver and gold thread and dyes. The war affected their business by withholding the supply of dyes, by the very high cost of production, and by the failure of the export trade. There were very few clear ideas as to the future prospects of their business. One man was anxious 'to save something and thus to open a small weaving factory of my own.'

Rice to-day is down or has been to $1\frac{7}{8}$ measures the rupee; before the war it was selling at about six measures for one rupee. Ten years ago the price was twelve measures the rupee. Kerosene oil second quality has risen from Rs. 2-8-0 to 4-6-0 per tin; and best quality from Rs. 3-3-0 to Rs. 6 per tin.

Family budgets, of course, differ with each family, and I shall report here only one or two typical budgets:

A		Rs.
Monthly income of the head of the family	...	75
Contributed by other members of the family	..	10
Total		85

Monthly expenditure :		Rs.
For rent of house	..	12
For food	...	45
For clothing	..	8
For other expenses	..	4
Total		69

Difference ... 16

This family saves on the average Rs. 16 per mensem. They use their savings for marriages, or to spend otherwise whenever occasion arises.

B		Rs.	A.
Monthly income from all sources	...	7	0
Monthly expenditure :			
For rent of house	...	1	0
For clothing	...	0	8
For food	...	5	0
Total		6	8
Difference		0	8

This As. 8 is put as a 'Chit' to a merchant. This is a poor widow woman, whose husband died some years back, and she has no children. Her future is pathetic. She says: 'I have to adopt some one just to help me by his earnings and support me when I grow old.'

- C

	Rs.
Monthly income of the head of the family	... 40
Contributed by other members of the family	... 5
Total	... 45

Monthly expenditure :—

For rent of house	..	..	6
For clothing	..	..	2
For food	..	..	24
For other expenses	..	..	4

Total .. 35

Difference .. 10

This man says: 'Can save with the greatest difficulty Rs. 10. I give it to some relative or rich man just to clear off my debts.'

Of course, there are many wealthy men, large employers of labour, among the Saurashtras of Madura; but from the above budgets, which are typical, we must conclude that the great majority of their community are living a hand to mouth existence. It simply means that economic conditions must be improved.

To the last question, these are some of the answers given. What is your greatest need in order to improve your economic condition? 'Education on technical lines is needed, and also capital to improve the weaving industry.' 'Education is needed. Want of union and capital retard much of our progress.' 'No sufficient capital, which is the primary defect, and I cannot work longer being physically weak.'

From the foregoing evidence it seems to me that the three greatest needs of the community to bring about economic improvement are:

More general education for the children; technical training and modern methods in the conduct of the dyeing and weaving industries; and the practice of co-operation for the purposes of credit, and buying and selling.

With the above facts in mind and for the purposes of comparison it will be interesting to conclude his section with Mr. V. Rajagopalachariar's valuable note on the conditions of the weaving industry in Madura, prepared in 1893.

Number of silk weavers' houses.—The town of Madura is divided into ten municipal wards; of these ten wards the silk-weavers occupy the first, second, third, fourth and ninth wards and the number of silk weaver's houses may be roughly estimated at 5,000 or so. Houses are multiplying in these wards and the fresh additions are generally thatched huts occupied by the labouring classes. It would appear that weavers from other parts of the district finding no occupation in their respective places have migrated to the town of Madura and settled themselves down here. The records of the Municipal Office show that about 281 new houses have been created in these wards.

2. *Number of silk-weavers in the town.*—The silk-weavers as a class are a very prolific people. They are said to multiply more rapidly than the other classes. Fixing, therefore, the inmates of each house to be 4 to 5, the silk-weavers' population of the town of Madura may be roughly estimated to be between 20,000 to 25,000 including females and children. Of these about 10,000 including females may be said to belong to the actual cooly class who earn their living by daily wages. Next to these, come the petty traders who number from 400 to 500 families; some of these sell threads having purchased them in retail from the bigger merchants; some again sell lace in retail; some advance small sums of money to the holders of looms and order a small supply of cloths and sell them to the richer merchants. Some are brokers who collect cloths manufactured in the town and sell them either to the merchants in the town or to those abroad and very few are capitalists who have any large trading concerns. The last class may almost be counted on one's fingers and it is said they are likely to be only between ten and twenty on the whole. It is the brokers who form a comparatively large number. Some of the silk-weavers have become agriculturists, finding that the profession of weaving does not pay. Their holdings are small and they only eke out their

maintenance from the results of the agricultural labour. Some are said to keep carts and bulls and to be employed in collecting sand from the river for building purposes.

3. *Their average income.*—Of the class of merchants those who get profit of about Rs. 100 and more per month are only 5 or 6; about twenty or thirty get from Rs. 50 to 100 and those who get Rs. 5 to Rs. 20 are about 400 or 500. The profession of brokers is not very remunerative. A broker makes a profit of one anna on every rupee, but to earn a profit of 30 or 40 Rs. in a month he has to employ two agents, one to go about the town and watch the progress of the cloths entrusted to the labourers, and another to keep accounts. Very often he has to borrow money and pay the weavers in advance.

The average income of a cooly family is Rs. 5 a month and it never goes higher than Rs. 10 a month. Females also work; some are employed in preparing the threads for weaving, some in the dyeing of cloths and others in the making of spots or what is called sundadis. Boys of 12 years and more also earn wages and generally get from one rupee upwards,

4. *The quantity of cloths manufactured in the town,* their different kinds and the average values thereof. The number of looms in the town is about 3,500. About four cloths can be woven from a loom in a month. This gives a total of 14,000 cloths per month for the whole town.

The different kinds of cloth manufactured are the following:—

Palukka Salais of the value of Rs. 2 to 3½.

Urumals—of the value of Re. 1 to Rs. 6 per tau or tari consisting of 8 each.

Plain male cloths with silk borders—of the value of Re. 1 to Rs. 4.

White laced head kerchiefs dyed—of the value of Rs. 7 to Rs. 12 the charge for dyeing being Rs. 2 or Rs. 3 in excess.

Chittadais—Of the value of Rs. 3 to Rs. 8.

Female cloths of sorts—the ordinary ranging from Rs. 6 to Rs. 20 and special cloths from Rs. 40 to Rs. 80.

Upper cloths—of the value of Rs. 10 to Rs. 15.

Rupees 500 is the highest value of a cloth which has ever been made in Madura. Merchants of their own accord do not order for cloths of value of more than Rs. 80 to Rs. 100. The cloths made ordinarily range from Rs. 6 to Rs. 10 only in value.

The introduction of cotton twist from England, of lace from France as well as even the dyeing stuff from Bombay has considerably affected the value of the cloths made in the town and necessarily the wages to the coolies and the profits to the merchants.

Of the 14,000 cloths above mentioned as being made in a month in the town, for 7,000 to 10,000 cloths the inferior brass lace is used and the value of these does not go over Rs. 6 at the utmost. Their average price may be fixed at Rs. 2½ per cloth and this gives the sum total of Rs. 17,500 to Rs. 25,000. The average value of an ordinary cloth with good lace may be fixed at Rs. 6 and supposing that good lace is used for the remaining 4,000 cloths their approximate value amounts to Rs. 28,000. Thus the total value of cloths made in the town in a month may be fixed at Rs. 50,000 to Rs. 60,000.

To get an impression of how much of this sum of Rs. 60,000 actually benefits the townsmen and how much goes to other countries and places, what the component parts of a Madura cloth are must be examined. Let me take for illustration an ordinary white cloth which is sold in the town for Rs. 10. The different items which go to make this sum of Rs. 10 may be described as follows:—

	Rs. a. p.		
Value of thread	1	0	0
Cost of preparing the same for weaving..	0	2	0
Profit earned by the merchant who sells the thread	0	1	0
Cost of fastening the thread to the loom.	0	1	0
Wages for weaving thread into a cloth ...	1	4	0
Value of the lace	6	0	0
	8	8	0
Merchant's profit including brokerage ...	1	8	0
Total ...	10	0	0

When this cloth is dyed the excess charge is as follows:—

For the first and rough clothing ...	0	12	0
For the making of spots ...	0	12	0
For dyeing them over again ...	0	12	0
Miscellaneous	0	4	0
Total ...	2	8	0

Thus, the great portion of the value of a cloth goes for the lace which is manufactured in France. Then by the cotton twists used, it is the English merchants who are benefited. The dye is also prepared abroad and the greater portion of Rs. 1-12-0 spent for dyeing goes also to other hands. The portion of Rs. 12-8-0 which actually circulates among the townsmen may be taken at the highest to be from Rs. 4 to 5 or one-third of the value of the cloth. This calculated with reference to the Rs. 60,000 worth of cloth yields a total amount of Rs. 24,000 to

Rs. 30,000 and this amount may roughly be fixed to be the sum earned from the industry by cooly upwards to the richest merchant. Deducting again Rs. 5,000 or so as being the profits earned by merchants there remain Rs. 25,000 to be distributed amongst 5,000 families, giving an average of Rs. 5 per family, the amount mentioned above, as being the average income of a family. Generally speaking the industry is becoming day by day less profitable to the actual working classes. The causes thereof are not far to seek. Prior to the importation of cotton twist, some 50 years ago, it would appear there were in the town of Madura 2,000 to 3,000 families employed in spinning yarn. This vocation has entirely ceased now. Again, prior to the importation of lace there were 500 Mussulman families engaged in making lace, and in their place there are, it would appear, only 10 families employed in making country lace. The preparation of colouring materials was at least done locally till a year or two ago, but this too has been superseded by the Bombay articles. As a necessary result of the cessation of all these vocations, the labour is now directed entirely in one direction towards weaving and it is in consequence very cheap. What used to be paid for at Rs. 2 in former years is now remunerated by Re. 1 only.

Even as regards the merchant class, the general complaint is that the trade does not pay. It may be that a large number of cloths are now made than before, but what merchants make as profit by reason of the cheapness of the commodity and keenness of competition seems to be considerably less than what it was in former years. A cloth which was sold for Rs. 60 is now sold for only Rs. 30.

As a curious illustration of how the importation of the English-made goods has affected the local weaving industry, it may be mentioned that the weavers themselves of the town of Madura hardly use the cloths woven by them. Mulls and piecegoods have taken the place of the home made articles and if the richer class should seek for some country cloths, it is the Conjeevaram cloths that are made use of. The females likewise use the 'thombu' and if they seek for some better country-made cloths, they purchase the Koranadu cloths. Thus it happens that one or two per cent of the town-made articles are sold in the town itself and the rest are sent abroad.

The habits and manners of the silk weavers as a class—Silk weavers as a class lead a simple life. Their food is simple and consists of jolum, cumbu and other dry grains. Rice is used by comparatively few persons only. Their clothing is simple. The females wear a cloth of Rs. 2 worth only except on festive occasions when they wear the Koranadu

cloths. House accommodation is necessary for their profession, and the man endeavours, therefore, first to secure a house for himself. House-holds are mentioned to have some gold jewels. A silk-weaver's property consists generally of his house and ornaments. Marriage is costly with them. About Rs. 63 must be paid to the bride even by the poorest man. To meet this item of expenditure, almost every cooly before he enters on profession begins to subscribe to some chit transaction or other and to save out of his hard earned wages one rupee or so to be paid monthly for a series of years extending from five to seven. Before he earns his prize in his turn, necessity, however, often compels him to borrow, mortgaging his chit amount and the house owned by him. It is such documents that are registered in large numbers in the town offices of Madura. There is another peculiarity about these silk weavers. They seldom borrow from other than their castemen. In case of loans of large sums, probably they may resort to the Nattukottai Chetty, but all ordinary loans are contracted from one of their community.

In addition to the town of Madura, the weaving industry is carried on in the following places in the district—Dindigul, Paramakudi, Palni, Tirumangalam and Aruppukottah. In Dindigul only laced cloths are made to the value of Rs. 10 or so. In all the stations the industry is said to be declining so much that weavers from these places come up to Madura for employment and overcrowd the market.

Leathers and commodities made from the skins of fish were exhibited recently in New York by Mr. Redfield, Secretary of Commerce, who stated that with the operation of four large fish tanneries by one firm the practicability of fish leather is assured. He showed a travelling bag of shark skin, lined with buff leather and made from the skin of a dog fish, which equalled in appearance and leather bog on the market, book covers made of shark skin and shoes made with dog skin uppers. It was said that only an expert could tell the difference between them and real leather. Cordovan, equalling or excelling that made from horse hide, has also been produced from fish skins. One skin, recently tanned, measured 12 by 24 feet.

INDIAN CURRENCY COMMITTEE REPORT.

THE Report of the Indian Exchange and Currency Committee presided over by Sir Henry Babington Smith was published in India on Feb. 2. It is signed by all the members of the Committee except Mr. Daiba M. Dalal, the only Indian member, who, we note, has submitted a dissenting minute.

The fundamental recommendations of the report are as follows:—

- (a) that the present rupee, unchanged in weight and fineness, should remain unlimited legal tender;
- (b) that the rupee should have a fixed exchanged value and that this exchange value should be expressed in terms of gold at the rate of one rupee for 11'30016 grains of fine gold, that is, one-tenth of the gold contents of the sovereign;
- (c) that the sovereign which is now rated by law at rupees 15 should be made legal tender in India at the revised ratio of rupees ten to one sovereign;
- (d) that the import and export of gold to and from India should be free from Government control as soon as the change in the statutory ratio has been effected, and that the gold mint at Bombay should be open for the coinage into sovereigns of gold tendered by public;
- (e) that the notification of Government undertaking to give rupees for sovereigns should be withdrawn;
- (f) that the prohibition on the private import and export of silver should be removed in due course and that the import duty on silver

should be repealed unless the fiscal position demands its retention.

SUMMARY OF CONCLUSIONS.

The following is the official summary of recommendations :—

- (i) It is desirable to restore stability to the rupee and to re-establish the automatic working of the Indian currency system. (Para. 36.)
- (ii) The reduction of the fineness or weight of the rupee (Para. 38), the issue of 2 or 3 rupee coins of lower proportional silver content than the present rupee (Para. 39), or the issue of a nickel rupee (Para. 40) are expedients that cannot be recommended.

If the legal tender limit of one-rupee for the 8 anna nickel coin should prove an obstacle to its free circulation the question of raising the limit to Rs. 5 or Rs. 10 should be considered. (Para. 40.)

- (iii) The maintenance of the convertibility of note-issue is essential, proposals that do not adequately protect the Indian Paper Currency from the risk of becoming inconvertible cannot be entertained. (Para 41.)

- (iv) The rise in exchange, in so far as it has checked and mitigated the rise in Indian prices, has been to the advantage of the country as a whole, and it is desirable to secure the continuance of this benefit. (Para. 50.)

- (v) Indian trade is not likely to suffer any permanent injury from the fixing of exchange at a high level.

If, contrary to expectation, a great and rapid fall in world prices were to take place, and if the costs of production in India fail to adjust themselves with equal rapidity to the lower level of prices, then it might be neces-

sary to consider the problem afresh. (Para 51.)

- (vi) The development of Indian industry would not be seriously hampered by a high rate of exchange. (Para. 52.)
- (vii) The gain to India of a high rate of exchange for meeting the Home charges is an incidental advantage that must be taken into consideration. (Para 53.)
- (viii) To postpone fixing a stable rate of exchange would be open to serious criticism and entail prolongation of Government control. (Para 58.)
- (ix) The balance of advantage is decidedly on the side of fixing the exchange value of the rupee in terms of gold rather than in terms of sterling. (Para 56-7.)
- (x) The stable relation to be established between the rupee and gold should be at the rate of Rs. 10 to one sovereign, or, in other words, at the rate of one rupee for 11'30601 grains of fine gold, both for foreign exchange and for internal circulation. (Para 59.)
- (xi) If silver rises for more than a brief period above the parity of 2s. (gold) the situation should be met by all other available means rather than by impairing the convertibility of the note-issue. Such measures might be (a) reduction of sale of Council bills; (b) abstention from purchase of silver; (c) use of gold to meet demands for metallic currency. If it should be absolutely necessary to purchase silver, the Government should be prepared to purchase even at a price such that rupees would be coined at a loss. (Para. 59.)

- (xii) Council drafts are primarily sold not for the convenience of trade, but to provide for the Home charges in the widest sense of the term. There is no obligation to sell drafts to meet all trade demands; but, if without inconvenience or with advantage, the Secretary of State is in a position to sell drafts in excess of his immediate needs, when a trade demand for them exists, there is no objection to his doing so, subject to due regard being paid to the principles governing the location of the reserves.

Council drafts should be sold, as now, by open tender at competitive rates, a minimum rate being fixed from time to time the basis of the sterling cost of shipping gold to India. At present this rate will vary; but when sterling is again equivalent to gold, it will remain uniform. (Para 61.)

- (xiii) The Government of India should be authorised to announce, without previous reference to the Secretary of State on each occasion, their readiness to sell weekly a stated amount of Reverse Councils (including telegraphic transfers) during periods of exchange weakness at a price based on the cost of shipping gold from India to the United Kingdom. (Para 62.)

- (xvi) The quantity of gold taken by India for all purposes in the period before the war was not disproportionately large having regard to her social customs and economic position; but more productive methods for employing wealth should be encouraged. (Paras 63-4.)

- (xv) The import and export of gold to and from India should be free

from Government control. (Para 65.)

- (xvi) The Government should continue to aim at giving the people the form of currency which they demand, whether rupees, notes or gold; but gold can be employed to the best advantage in the Government reserves, where it is available for meeting the demand for foreign remittance.

It would not be to India's advantage actively to encourage the increased use of gold in the internal circulation, but it may for some time be difficult to meet all demands for metallic currency in rupees, and a more extensive use of gold may be necessary. In order that confidence may not be disturbed by exceptional issues, the issue of gold coin in moderate quantities should be one of the normal methods of meeting demands for currency. (Para. 66.)

- (xvii) The Bombay branch of the Royal Mint should be re-opened for the coinage of sovereigns and half-sovereigns and facilities should be afforded to the public for the coinage of gold bullion and for the refining of gold. (Para. 67.)

- (xviii) The obligation of the Government to give rupees for sovereigns should be withdrawn. (Para. 68.)

- (xix) Opportunities should be afforded to the public to exchange sovereigns in their possession at the rate of 15 rupees per sovereign at the time of the introduction of the new ratio. Similar opportunities should be given to holders of the gold mohur which should eventually be demonetised. (Para. 69.)

- (xx) The prohibition on the import of silver should be removed as soon as is convenient. (Para. 70.)

(xxi) When the prohibition on the import of silver is removed the imports duty should also be removed, unless the fiscal position demands its retention. (Para 72.)

(xxii) The prohibition on the export of silver should be retained for the present with a view to the protection of the silver currency depletion by export.

If the silver mined in India should cease to be purchased by the Government, its export should be permitted under licence. (Para. 72.)

(xxiii) Improved banking facilities and increased opportunities for the investment of savings should be afforded. (Para. 73)

(xxiv) No recommendation is made for modifying the present practice regulating the purchase of silver for coinage. (Para. 74.)

(xxv) The statutory minimum for the metallic portion of the paper currency reserve should be 40 per cent of the gross circulation.

As regards the fiduciary portion of the reserve the holding of securities issued by the Government of India should be limited to 20 crores. The balance should be held in securities of other Governments comprised within the British Empire, and of the amount so held not more than 10 crores should have more than one year's maturity, and all should be redeemable at a fixed date. The balance of the invested portion above these 30 crores should be held in short-dated securities, with not more than one year's maturity, issued by Governments within the British Empire.

The existing permissive maximum of 120 crores should be retained for a limited period.

The sterling investments and gold in the Paper Currency Reserve should be re-valued at 2s. to the rupee. The depreciation which will result from this re-valuation cannot be

made good at once, but any savings resulting from the rise in exchange will afford a suitable means for discharging this liability in a limited number of years. (Paras. 78-79.)

(xxvi) With a view to meeting the seasonal demand for additional currency provision should be made for the issue of notes up to 5 crores over and above the normal fiduciary issue as loans to the Presidency Banks on the security of export bills of exchange. (Para. 80.)

(xxvii) The silver and gold in the Paper Currency Reserve should be held in India except for transitory purposes. (Para. 81.)

(xxviii) As soon as circumstances permit, free facilities for the encashment of notes should be given, and the restrictions imposed during the war should be withdrawn. The Government should have the option of redeeming its notes in full legal tender gold or silver coin. (Para. 82.)

(xxix) No limit can yet be fixed to the amount up to which the Gold Standard Reserve should be accumulated, and when profits again accrue on the coinage of rupees they should be credited in their entirety to the reserve. (Para. 83.)

(xxx) Under present conditions Government should hold such gold as they obtain in the Paper Currency Reserve rather than in the Gold Standard Reserve. The Gold Standard Reserve should, when practicable, contain a considerable proportion of gold; but the most satisfactory course at present lies in keeping the reserve as liquid as possible by the holding of the securities with early dates of maturity.

The amount of securities in the reserve with a maturity exceeding three years should not be increased, and the aim should be to hold all the invested portion of the reserve in securities issued by Governments within the British Empire (other than the Government of India) and having a fixed date of maturity of not more than 12 months. (Para 84.)

(xxx) A portion of the gold in the Gold Standard Reserve, not exceeding one-half, should be held in India; the sterling investments should continue to be held in London (Para. 85.)

We desire to place on record, the Committee add at the conclusion of their Report, our high appreciation of the services rendered by Mr. C. H. Kisch, C.B., and Mr. H. Denning, I.C.S., as Secretaries to the Committee. They have discharged the duties entrusted to them with unfailing promptness and courtesy, and their valuable assistance has greatly facilitated our enquiry.

(Signed).—H. Babington Smith, Chalmers, Murshal Reid, J. B. Brunyate, F. C. Goodenough, C. S. Addis, C. T. Needham, M. M. S. Gubbay, W. B. Hunter T. W. McMorran.

THE MINORITY REPORT.

The following are the recommendations which Mr. Dalal, has made in his minority report :

- (a) The money standard in India should remain unaltered; that is, the standard of the sovereign and gold mohurs with rupees related thereto at the ratio of 15 to 1.
- (b) Free and unfettered imports and exports by the public of gold bullion and gold coins.
- (c) Free and unfettered imports and exports by the public of silver bullion and silver coins.
- (d) The gold mint at Bombay to be continued and to receive gold bullion from the public and to

coin free of charge gold mohurs of the same exact weight and fineness as the sovereign and to hand them over to the tenderers of gold bullion in less than 15 days.

- (e) The Bombay mint to undertake refining of raw gold for the public and not to make any profit on the transaction.
- (f) The existing silver rupees of 165 grains of fine silver at present in circulation to continue full legal tender.
- (g) As long as the price of silver in New York is over 92 cents Governments should not manufacture silver rupees containing 165 grains fine silver.
- (h) As long as the price of silver is over 92 cents Government should coin 2 rupees silver coins of reduced fineness compared with that of the present silver rupee and the same to be unlimited legal tender.
- (i) Government to coin a new 8 anna silver piece of reduced fineness and the same to be unlimited legal tender.
- (j) Government not to coin an 8 anna nickel piece.
- (k) Government to sell Council bills competitive tenders for the amount defined in the Budget as required to be Secretary of State. The Budget estimate to show under separate headings the amount of Council bills drawn for Home Charges, for Capital Outlay, and Discharge of Debt. Council bills to be sold for Government requirements only and not for trade purposes, except for the purpose mentioned in the next succeeding recommendation.

- (l) "Reverse" drafts on London to be sold only at 1s. $\frac{2}{3}$ d. The proceeds of "Reverse" drafts to be kept apart from all other Government funds and not to be utilised for any purpose except to meet drafts drawn by Secretary of State at a rate not below 1s. $\frac{3}{4}$ d. per rupee.
- (m) Currency notes should be printed in India.
- (n) Government not to interfere with the immemorial practice of the Indian public of melting current coins.
- (o) The sterling investments held against the Indian note issue to be liquidated as early as possible and transmitted to India in gold.
- (p) The use of one-rupee currency notes to be discontinued as early as possible and meanwhile not to be forced into circulation.

SECRETARY OF STATE'S VIEWS.

The following announcement by the Secretary of State regarding the recommendations of the Indian Currency Committee, is published for general information :—

"The Secretary of State for India has considered in consultation with the Government of India the majority and minority reports received from the Committee appointed by him under the chairmanship of Sir Henry Babington Smith, to advise on the subject of Indian exchange and currency. The majority report, which is signed by the Chairman and all members of Committee, except Mr. D. M. Dalal, states as its object the restoration of a stable and automatic system and the maintenance of the convertibility of the note issue.

3. After setting forth the main recommendations, the Secretary of State proceeds: These recommendations develop with the necessary modifications required by altered circumstances the principles on which the

Indian currency system was established before the war, and are accepted by the Secretary of State in Council as expressing the goal towards which Indian administration, following the previous policy, should now be directed.

4. Under the conditions existing prior to the war sterling and gold were identical standards. The existing disparity has made a choice between these standards necessary, and the Committee's recommendation is in favour of placing the rupee on a gold basis.

5. In recommending a rate, namely that above mentioned, for the exchange value of the rupee the Chairman and majority have taken account of the high range of silver prices and of the importance of safeguarding the convertibility of the Indian note issue by providing so far as possible that the token character of the rupee shall be restored and maintained, *i.e.*, that the Indian Government may be in a position to buy silver for coinage into rupees without loss. They were also impressed by the serious economic and political risks attendant on a further expansion of Indian prices such as must be anticipated from the adoption of a low rate.

6. The arguments advanced in favour of a gold basis and of high rate of exchange appear to the Secretary of State in Council to be conclusive, and he has decided to take the necessary steps to give immediate effect to the recommendation on these points. Accordingly, the Government of India have today announced that the rate which they will pay for gold tendered to them under the Gold Import Act by private importers will henceforth be fixed at one rupee for 11,30,016 grains of fine gold, *i.e.*, Rs. 10 for the gold contents of the sovereign. The consequential changes in the regulations relating to the sale of Council drafts by the Secretary of State in Council and of reserve drafts by the Government of India will be notified separately.

7. The question of the internal ratio presents special difficulties. The Committee recommend the maintenance of gold on a legal tender footing especially in view of possible difficulties in obtaining adequate supplies of silver. A fixed ratio must, therefore, be established between the rupee and gold, as used in the internal circulation, either one sovereign for Rs. 15 as at present or one sovereign for Rs. 10 in correspondence with new exchange ratio. There form alternative would give the sovereign the status of an over-valued token coin, necessitating permanent control over the import of sovereigns and making an open gold mint impossible. The Secretary of State in Council agrees with the Committee that such conditions ought not to be contemplated as a permanent arrangement. On the other hand, the lower ratio cannot be effectively introduced while a great disparity continues to exist between the commercial price of gold in India and the intended Indian mint par of one sovereign for Rs. 10.

8. Present conditions are a product of the war and in some sense artificial. They cannot be immediately remedied without the risk of shock to the economic and monetary system in India, and of reaction elsewhere to which India cannot in her own interests be indifferent: a gradual process of rectification and of adjustment to new conditions is required. For some time past action has been taken in India to reduce the premium on gold by regular Government sales of bullion to the public and this measure will be further developed. It may be expected that in that way a natural adjustment may be effected until the path to legislation is cleared.

9. The Secretary of State has decided, therefore, first, that the import of gold shall continue for the present to be controlled by license under the Gold Import Act, with a fixed acquisition rate as mentioned above; second, that meanwhile, periodical sales of gold bullion to the public shall continue;

and third, that as a provisional measure during the transition period sovereigns shall remain legal tender at the present ratio of Rs. 15.

10. In arriving at these decisions the Secretary of State in Council has not failed to give careful consideration to the minority report signed by Mr. D. M. Dalal. Mr. Dalal's main object is the effective restoration and maintenance of the ratio of 15 rupees to a sovereign as a measure both of exchange and of the circulating value of the rupee. In order to secure this he relies upon freedom for the melting and export of rupees and correspondingly to freedom for the import of gold. To meet the possible result in shortage of silver coins he recommends that as long as the New York price of silver remains above 92 cents Government should coin two rupee silver coins of reduced fineness, the coinage of rupees of the present weight and fineness being meanwhile suspended and only reissued when the price of silver falls to the figure named. He also recommends that sterling drafts on the Secretary of State should be sold only at 1s. 3 $\frac{2}{3}$ d.

11. The Secretary of State in Council is satisfied that this programme could not be adopted without untoward consequences. The heavy exports of silver coin to be anticipated under the scheme must threaten not only the whole silver circulation but also the Government reserves of silver coin, and entail the gravest risk of inconvertibility of the Government note issue. The demand for the gold required continually to make this deficiency good must greatly aggravate any strain there may be on the gold stock of world when the freedom of import is restored. Nor is it safe to assume that these difficulties could be met by issuing new silver coins of inferior fineness; the evidence against the acceptability of an inferior substitute for the present rupee has impressed the majority, and their recommendation on this head is

accepted by the Secretary of State as decisive. Mr. Dalal's recommendation in regard to the rate for sterling drafts, if adopted, must produce an immediate crash in exchange bringing unmerited disaster to those who have reasonably relied on some continuity of policy. The only cover which his scheme affords is the export of the country's circulating currency. In any case even if a return to the pre-war level of exchange could be accomplished without a shock to trade or risk to the Currency system it would lay India open to a further serious inflation of prices, while the majority's recommendation would tend towards a reduction of general price levels in India.

12. Both during and since the war Indian currency and exchange have presented problems previously unanticipated and more perplexing than any encountered since the decision to close the mints in 1893. But the Secretary of State in Council is satisfied that decisions reached promise an eventual solution, and he desires to express his acknowledgment to the Committee and their Chairman for the ability and thoroughness with which they have explored the issues and framed their recommendations."

INDIAN GOVERNMENT'S ACTION.

The following Press Communique has been issued by the Government of India:—

The acquisition rate for gold imported under license into India, which has hitherto been subject to variation notified from time to time, has now, in accordance with the Secretary of State for India's separate announcement published to-day relating to the recommendations of the Indian Currency Committee, been fixed and the following fixed rates will apply to transactions on and after Monday the 2nd February, namely, ten rupees for each sovereign tendered for import or one rupee for 1,130,016 grains of fine gold.

2. Council drafts will continue to be offered at the Secretary of State's discretion

for weekly sale at the Bank of England by competitive tenders. The rate for deferred telegraphic transfers and Bills will, until further notice, rank for allotment with tenders at one-sixteenth of a penny higher for immediate telegraphic transfers. No announcement will be made of the minimum rate at which tenders will be accepted, and the Secretary of State in Council reserves the right of rejecting the whole or part of any tender. In accordance with the Committee's recommendations the Government of India will, when occasion requires, offer for sale stated weekly amounts of sterling reverse drafts on the Secretary of State (including immediate telegraphic transfers). The rates for immediate telegraphic transfers on London will be announced on each occasion by the Controller of Currency and will be based on the sterling equivalent of the price of 1,130,016 grains fine gold as measured by the prevailing sterling dollar exchange, less a deduction representing the charge of remitting gold. The rate for deferred drafts on London will, until further notice, be one-sixteenth of a penny higher than the immediate rate, as at present.

3. The Finance Department notification No. 4071 dated the 11th September, 1897, providing for the issue of rupees at the Reserve Treasuries in Calcutta, Madras and Bombay, in exchange for sovereigns and half sovereigns, at the rate of Rs. 15 and 7½ respectively, is cancelled. Notification No. 6908 A. dated the 11th December, 1906, regarding the receipt of sovereigns and half sovereigns at the Mints is also cancelled.

4. The existing prohibition on the import of silver is cancelled, and the import duty of 4 annas an ounce is abolished. The prohibition on the export of silver remains.

5. The notifications under the Defence of India Act prohibiting the use of gold and silver coin otherwise than as currency or dealing therein at a premium, are cancelled.

II

BY PROF. V. G. KALE, M.A.

THE main question which the Indian Currency and Exchange Committee had to solve was essentially one of readjustment and renovation. The currency system of India which, having stood the test of years, had come to be looked upon as an eminently economical and satisfactory arrangement, was dislocated during the time of war and there was no immediate prospect of its being restored to a normal condition. The sterling value of the token rupee had to be successively raised from 16d. to 28d. and the stability of the gold exchange, which was the very foundation of the currency system broke down. The currency crisis of the latter part of the war period, was not of temporary duration as in dislocation of 1907-08 had been, so that it could not be met by emergency measures such as the sale of sterling drafts on London, designed to keep the exchange from going below the gold export point. The exchange difficulties and the currency embarrassment of the war period were of a more permanent and far reaching character which threatened to alter the system in its most important features. They made the future uncertain and raised serious doubts as to the possibility of the restoration of healthy conditions. Exchange was being put up by Government in response to each rise in the price of silver which continued soaring higher and the Secretary of State for India was anxious to know how it could be stabilized. The Currency Committee was, therefore, asked to advise him as to how and where the sterling value of the rupee could be fixed under the peculiar circumstances created by the war and by the general economic world situation as it prevailed after the close of the struggle. The Committee was not to bother itself

about bimetallism or a gold standard having a chance of being introduced in India with success but was to restrict itself to the gold exchange standard on which the Indian system of currency rested for about twenty years and on which it was to stand in the future. Briefly, it was to suggest a suitable ratio of the rupee with gold and the measures that would have to be taken to maintain it in spite of dear and scarce silver. The Committee was likewise asked to make recommendations with respect to the readjustment of Government's policy of the war period in connection with the proper currency of gold standard reserves, the sale of council drafts and other subsidiary matters.

Some people are of opinion that fluctuation in the rate of exchange is not such a serious disadvantage that Government should go out of its way to alter its currency system and practice with a view to secure stability and they are inclined to take the view that fixity of exchange may be purchased with too dear a price. The Currency Committee, therefore, started with the enunciation of the principle that instability was a nuisance and must be put an end to without the least delay. But the questions that immediately arose were: could exchange be lowered to an old 16d. rate and be fixed there? If this were to be attempted, what measures would be necessary for attaining that object and would the adoption of those means not be attended with evil consequences? What other rate would be practicable if the old ratio was out of the question? The Currency Committee's serious decision was that exchange having reached the level of 28d., it was desirable to fix it as near that rate as possible and that there were insuperable difficulties in the way of putting it lower. On this fundamental question, Mr. Dalal, the only Indian member of the Committee, could not agree with his colleagues and expressed the opinion in a minority report that the depart from the established legal ratio of 16d. was equivalent to violating India's money

standard. He was emphatic in his declaration that except temporarily, the old ratio should not have been changed and that it was Government's wrong policy of bringing large quantities of dear silver and coining crores of rupees for internal circulation when what people required was payment in the precious metals for the large balance of trade in their country's favour which persisted year after year, that was responsible for our currency difficulties and abnormally high exchange, Mr. Dalal contended that by prohibiting the export of silver from India and selling rupees in this country against British securities held in London, Government drove the price of the white metal high against itself. According to him, it was of the utmost importance to maintain the exchange value of the rupee at 16d. and to do that with success, Government might issue a new silver coin which it would not be difficult to maintain as a token even with silver prices ruling high.

The majority report of the Currency Committee would not even look at my suggestion that meant tampering with the existing rupee. People had become accustomed to the rupee for generations and Government could not afford to do anything to that coin which was calculated to shake public confidence. If raising of the exchange was an evil, it was a lesser evil than the altering of the rupee currency or a declaration of the inconvertibility of notes, which were the only two alternative courses that had been suggested as remedies. 'Debasement' of the rupee, the issue of a new silver token coin and allowing notes to become inconvertible, were proposals that the Currency Committee rejected as inadmissible and decided in favour of a 24d. exchange. On account of the constantly fluctuating exchange between England and America, however, the rupee could not be linked up with sterling and had to be fixed up with gold. It was, therefore, recommended that the value of the rupee should be fixed in gold at 11'3 grains per rupee and

that with this ratio the rate of exchange should be 24d. (gold). The Committee felt satisfied, on the strength of the evidence placed before it, that the price of silver would decline, in the near future, to about 62d. per ounce and would enable Government to keep the exchange at the proposed rate. In order that the new exchange rate should be maintained, it was suggested by the Committee that control exercised by Government over the imports and the exports of the precious metals should be removed, that a gold mint should be set working in Bombay to coin sovereigns and that the obligation of Government to pay rupees in exchange for sovereigns should cease. These measures were intended to ensure the import of gold and the circulation of gold coins with a view to provide for the legislation of India's favourable trade balance and the supplementing of the silver currency with gold coins in circulation. The Committee believed that the restriction of the sale of council drafts to the actual needs of the Secretary of State on account of funds in London and the free imports of gold into India to make up the trade balance would suffice to satisfy the currency requirements of the people and it went to the length of recommending that if the price of silver remained inconveniently high, Government might issue rupees, if necessary in emergencies, even at a loss in order to protect the rate of exchange.

One important effect of the high rate of exchange adopted by the Indian Government on the recommendation of the Currency Committee, is to check exports and stimulate imports. With the rupee at 24d. producers of exportable commodities in India will receive smaller quantity of currency in exchange for them, while importers of foreign goods need pay only a smaller price expressed in terms of the rupee for purchases made by them. The loss of producers is the gain of importers and of the consumers of foreign goods. This consideration which is urged

against a high exchange, was the most weighty argument accepted by the Currency Committee in favour of the policy recommended by it. The Committee came to the conclusion that high prices which inflicted a severe hardship on the mass of the population and created so much unrest and discontent in the country, could be beneficially concluded by means of a high exchange which would, besides, mean a considerable saving on the Government of India on its remittances on account of the home charges. The sterling investments of Government would, no doubt, have to be revalued at the new exchange rate and that would involve a loss. But the saving of more than twelve crores on the home charges would, in three years' time, make up that loss and leave a surplus to Government to be expended on schemes of material development in the near future. The Committee thought that the high prices which Indian commodities would continue to be consumed in the world's markets would be sufficient to compensate the Indian producer for the loss entailed by the enhanced rate of exchange but its own doubts as to the possibilities in this behalf and could not help stating that Indian cost of production might not, after all, respond to lower prices that might be restored in other countries and the problem of exchange would have to be reconsidered if such a contingency occurred.

There is considerable force in the arguments urged by the Committee in favour of its recommendation to fix the rupee at 24d. gold, a rate nearer to the prevailing ratio. Its recommendation about free imports of the precious metals and the coinage of sovereigns in India is likewise a move in the right direction. But we deplore the necessity to which it was driven to propose the fixing of the rupee at a high level. If tampering with the rupee currency and its debasement were bad, its artificial enhancement was not less so. Other nations, including England, are trying to correct and maintain this exchange by manipulating their token currencies. We in India, have decided to holster up the token currency by manipulating the exchange. India has had no true gold standard, no automatic currency and its terms of reference pinned the Committee down to the exchange standard. Our currency system must be based upon a true gold standard with the rupee as a token and subsidiary currency if the silver standard or bimetallism is not

available. To persist in having an exchange standard in the face of our normal favourable trade balance and of our power to attract gold in payment for our surplus export, is as unnecessary as it is detrimental to the best interests of the people. How is Government going to make the saving of twelve crores a year, for example? It will benefit along with other remitters of sterling, practically by taking more from tax-payers. The indirect taxation of the people which made the Government of India's treasury overflow with surpluses in the early years of this century, will result from the policy of an artificially enhanced exchange. The chief recommendation of the Committee may appear to many as the only practical solution of an extraordinarily difficult problem and they may feel inclined to deprecate merely theoretical objections to the course proposed by it and adopted by Government. Mr. Dalal's attribute will be disapproved on this ground. But it is the kind of drifting into awkward currency situations which he has exposed that we strongly object to; and the position now attempted to be established, is not one that we may contemplate with comfort or with a feeling of security about the future. In matters of currency and exchange, there should be as little 'management' as possible and they should be allowed to develop automatically in response to the economic forces naturally at work. This principle is not, however, at the basis of the Indian system even as it is modified by the Currency Committee. We cannot, therefore, congratulate Government on the measures they will be called upon to make in order to maintain the exchange standard in India in consonance with the recommendations of the Committee though the latter may be given the credit which is its due for having grappled with the problem set before it with ability and done its best to find a solution under the limitations imposed upon it. Government will be doing nothing more than tinkering with the currency question, which has troubled it for more than forty years, in adopting the policy now favoured by it. And the instability of exchange which prevails at the moment and the large sale of 'reverse councils' which it is carrying on week after week, are not circumstances very auspicious for the success of its exchange and currency policy.

ECONOMICS IN THE WEST.

Indian Industrial Position.

London, 18th December, 1919.—The passing into law of the Indian Government Bill without doubt marks a new epoch not only in India's political but also her industrial history. In future swadeshi will have a new significance. Henceforward the development of the material resources of the country will be to a great extent in the hands of Indians and it depends upon how they use their opportunities whether progress is made or whether there is retrogression. Unless I am greatly mistaken the fears which are entertained on this subject in some quarters here as well as in India are baseless. The Indian commercial community is too conservative and too well grounded in practical affairs to adopt any course calculated to check the steady march of the country to a position of commanding influence in the industrial world. There will, I am convinced, be no violent break with the old tradition of co-operation with European elements in trade and industry. India has still much to learn in the domain of commerce and manufactures and though enthusiasts may in some directions at the outset press forward at too great a pace for prudence, in the long run the truth will be realised that more is to be gained by harmonious partnership with the West than in any narrow interpretation of the rights with which Indians have been endowed. Where we may expect an assertion of independence, and not unreasonably, is in the fiscal policy of the country. The notion that because Great Britain is an adherent of Free Trade, India must also be governed by those principles is plainly incompatible with the new freedom with which she has been endowed. If she works to build up her industrial position as other countries have done by protective duties she must be allowed to do so. If she is wise,

however, she will make no violent change with the past. Protection is a double edged weapon and any extreme application of the principle would almost inevitably check—and possibly very seriously check—her progress. Her true interest is to make haste slowly. With her marvellous resources and her highly intelligent and teachable population she has no necessity to attempt any short cuts to industrial eminence. Her day will assuredly come if she resolutely sets herself to apply the lessons she has already learned.

INDIAN COAL SUPPLIES.

In this letter I have on several occasions referred to the ignorance which exists here amongst those who speak for labour of Eastern industrial conditions and their probable influence on Western problems. From a statement made by Mr. Smillie the miners' leader at the recent special sitting of the Trade Union Congress it would seem that light is beginning to dawn upon the understandings of the workers' representatives in this country. Mr. Smillie's remarks on the occasion referred to had relation to the Government attitude on the subject of the nationalisation of the mines. According to the report of his speech he and his colleagues had been greatly disturbed by a report that arrangements were being made by the administration to import Indian coal into England in the event of a strike. "He believed," he said, "that money invested in the Indian mines was really British money, the money of 'patriots' who were keeping Indian miners working at 4½d. a day. If coal produced by those poor starved workers in the Indian mines were to be brought into the country he would not hesitate to advocate a general strike, and he hoped it would be the duty of the miners' federation to give every assistance they possibly could to secure for these Indian mine workers that which would not be given to them if they were left alone." The alarm here expressed at the possibility of Indian competition in the home market in respect of a commodity which has

long been regarded as a British monopoly is unmistakeable. It had evidently never occurred to the Miners' President before that if British miners refuse to work coal that the deficiency might to some extent be supplied from Indian sources. His pathetic interest in the sufferings of the low paid Indian worker is an indication of the direction in which the miners counter move may be made. But it will require a good deal more influence than the miners' federation can wield to redress the balance sufficiently to to make Indian coal an appreciably less formidable competitor with the British product, for a profound gulf separates the East and the West in the matter of wages and it will not be bridged by the interested efforts of the class which at the present moment is being extravagantly paid because it has been able to extort concessions out of the necessities of a war stricken community. And after all if there is to be an objection to low paid Eastern labour why should interest be limited to coal? Indian wheat is produced with the help of labour which is atrociously remunerated according to Western ideas. Indian tea and coffee are in the same position and the same may be said of jute manufactures. Indeed, if we are to be logical, we must go on general strike everytime a shipment of produce or manufactured goods comes from India. Of course, we shall do nothing of the kind either at the bidding of Mr. Smillie or any other Labour autocrat. On the whole it is, I think, a good thing that our mining friends are learning the invaluable lesson that they have not entirely a grip of the public's threat. The knowledge that if they go out of the mines coal may be imported to keep essential industries moving will tend to induce a more reasonable frame of mind than has been exhibited of late.

MOTOR FUEL RESOURCES.

From coal to oil is an easy transition in these days. I make it here because of the

great amount of talk about oil production from coal which is going on. There seems to be no doubt that we are approaching a real shortage in petrol owing to the excessive strain that has been put upon the principal oil fields. In the United States supply from indigenous wells is already unequal to the demand and more and more the Mexican fields are being drawn upon. Experts like Capt. "Montgomery of the Automobile Association are convinced that a world shortage is imminent and they talk of petrol rising to four shillings and even five shillings a gallon in the course of the next few years. Probably it was with an eye to this eventuality that the Government has just put an additional two millions capital into the Anglo-Persian Oil Company. Whether that he is so or not it is certain that we are on the eve of an official movement to extend the existing motor fuel resources of the country. The most promising direction that development is likely to take is the manufacture of benzole from coal. The Government are already working to this end by putting in force the recommendations of the Fuel Research Board in favour of compelling the gas companies to change the basis of their gas production and charge for the heat that it contains instead of the light that it gives. This means that something like an additional twenty millions of benzole will be produced. Another source of benzole supply will be furnished when the Government's Electricity scheme gets under weigh and the 100 million tons of coal now burnt in the raw state will be used for generating electricity. It is suggested by a worker in the *Birmingham Post* that if the new electricity undertakings are compelled to use only such fuel as has undergone treatment for the recovery of the by-products there would be an addition of 250 million gallons to our home produced fuel. Altogether we should then have 300 million gallons of benzole or enough to make us independent of foreign sources of supply. The subject affords a fascinating theme for

study and speculation. Indeed, there are some scientists who think that the question of motor fuel is the industrial problem of the day.

OIL CRUSHING INDUSTRY.

Some interesting details of the present position of the oil seed crushing industry were given recently in a paper read before the Society of Arts by Mr. John Westall Pearson, chairman and managing director of the British Oil and Cake Mills Co. (Limited). Before the war Germany largely monopolised the oil crushing industry though the bulk of the raw products of the industry were obtained from British sources. How completely the situation has been revolutionised was shown by Mr. Pearson in his paper. Where formerly manufacture was largely centred at Hull, at which port considerable consignments of oil producing seeds were received from the Baltic ports, there are now important factories at a dozen centres from Aberdeen and Dundee in the north to Gloucester, Bristol and Hertford on the south. Side by side with the increase in the number of oil crushing factories has been a considerable growth in the consumption of products manufactured from vegetable oils. Of margarine alone we use three times as much as we did before the war and our present output is a maximum of thousand tons a week. In the earlier pre-war period the only refining process used in England was the application of weak caustic soda for the purpose of neutralizing the free fatty acids in the crude oil followed by a steam and water wash and filtration over fuller's earth. But in the last two or three years large plants have been installed for the treatment of oil by the hydrogenating process, the general effect of which is to enable liquid oils to be used by either soap makers or margarine makers in place of hard oils. Mr. Pearson in some illuminating passages of his paper spoke of the enormous development in the trade of oil seeds. There were,

he stated, many varieties of oil seeds to be found in the tropical world, but they were either in districts at present inaccessible or else in a condition or form that renders them almost unserviceable. There was little doubt, however, that in years to come, with future scientific developments and treatment these would take their place among the important sources of oil supply. India, it needs scarcely to be pointed out, is deeply interested in this question of oil seeds. On the one hand she is able to contribute materially to the world's stock of the raw products from which the oil is extracted, and on the other she is capable of making her own contribution to the quantity of the manufactured product turned out. There has, I believe, been a great increase in the oil crushing trade in India, in recent years, but as yet the surface of the industry has only been scratched.

SUPPLY OF OIL FUEL.

The substitution of oil for coal as a motive power in working ocean steamships is making remarkable progress. Following an announcement that the new vessels now being constructed for the P. and O. Company are to be oil propelled comes a statement that another important Eastern Company—the well known Bibby Line—are having a large number of their ships converted for oil fuel, while in addition they have under construction two Diesel engined ocean going steamers, the completion of which may be expected during the coming year. A writer in the *Times Trade Supplement* expresses a doubt whether either coal owners or miners realize the serious menace to this industry which is involved in these wholesale concessions to oil fuel. At present there are difficulties in the way of the adequate supply of oil fuel, but the writer has no doubt that they will be overcome and that sufficient oil will during the next few years be available on all steamships on which it is convenient to use such fuel instead of oil.

words—and even here it must be filtered in some manner in order that nothing in it may clog the condenser tubes. Wire screens are therefore often placed at the entrance to the intake tunnel so that all water destined for the condensers must pass through them.

When this method of cleaning was first found to be necessary stationary screens were used. These, however, were not a success, as they were found to clog rapidly. Many experiments were tried. Following the stationary screen came the revolving screen. These have now been improved and developed to a high point, the largest and most successful example being installed in one of the generation stations of the Commonwealth Edison Company of Chicago, Illinois.

The Gold Street generating station of the Brooklyn Edison Company (New York), one of the most extensive in the country, has its intake tunnel almost at the entrance of a big trunk sewer. As may be readily imagined, if the water here were not thoroughly screened a large amount of sewage, even of solids, would be sure to find its way into the condenser tubes. A screen was installed in this intake and many and various objects have been brought to the surface by it. On one occasion, in particular, the body of a child was lifted by this slow-moving screen. It is such occurrences as this which make plain the absolute necessity of screening the water before introducing it into the delicate internal mechanisms of expensive machinery.

ALFRED T. MARKS.

NOTES.

The Bombay branch of the European Association has issued the following circular:—Some two months ago the sub-committee's report on the housing of Europeans in Bombay was circulated. Since that date the matter has been followed up by the committee who have been engaged in drawing up a thoroughly comprehensive scheme. This has entailed the collection of a mass of evidence, the drawing up of plans and estimates, the alteration and revision of certain portions of the original circular, and last but not least, negotiations with government with the object of obtaining as definite assurances as possible regarding the precise nature and scope of the assistance to be given to the scheme by government. The committee decided that it was better to risk a little extra delay in drawing up a detailed scheme than to circulate supplementary report on which no definite action could be taken and no definite appeal for capital could be made. This circular is merely to inform members that the final scheme is nearing completion. The committee have a suitable site in view sufficient to accommodate the probable immediate and future requirements of the European community. It is hoped that the scheme along with plans and estimates will be in the hands of all European firms being members of the Bombay Chamber of Commerce and Bombay Trades Association before the end of January, 1920. This scheme will be a definite appeal for capital to be employed for the building of housing accommodation for Europeans on the most favourable terms possible at an early date. The committee feel that the problem has become so acute that the time for mere discussion is now past. If a start is not made in the immediate future to provide the capital and make the necessary arrangements for the formation of a Public Utility Company with the object of acquiring a site and commencing building, the last

opportunity of doing so on anything like an economic basis will be lost. For two years the matter has now been keenly discussed by every European in Bombay. The opportunities of two years ago are no longer available. In the present orgy of land speculation it is likely that the opportunities of to-day will be lost in six months' time. The matter may be said already to have passed beyond the point where the problem can be solved by individual efforts or enterprise. The committee, therefore, asks members to give the matter their most careful consideration, so that when the scheme is put before them each firm may have some definite idea (1) of the amount of accommodation they are likely to require for their staff both now and in the near future, and (2) what amount of capital they are prepared to put down to secure the residential accommodation which is an essential condition to the successful development or even maintenance of their business. To enable members to form some rough idea of the amount of capital required to secure one flat the committee state that their estimates show that flats can be built at from Rs. 20,000 to Rs. 40,000 according to the different sizes and types. Including probable cost of land their estimates show that the total cost per flat of the various suitable designs provisionally selected ranges from Rs. 30,000 to Rs. 50,000 and for larger and more commodious types suitable for senior men about Rs. 1,10,000. It is pointed out that the tenure of the land will probably be a ninety-nine years lease and the land should be an appreciating asset.

In the humble form of "German Silver" nickel has been long familiar. This alloy of nickel and copper has been largely used in Germany and the United States for small value coinage. Britain would have none of it for many years, preferring silver and bronze, but the shortage of silver has changed all that and a new nickel coinage is to be issued. The nickel is to be supplied by

the Mond Company who have a special process of extracting it, the invention of Dr. Ludwig Mond in 1889. He found that when carbon monoxide is passed over metallic nickel at a temperature of 50 degrees C. there results nickel carbonyl, a volatile compound with the formula $\text{Ni}(\text{Co.})$. This compound when heated above 150 degrees decomposes again into metallic nickel and carbon monoxide. There are other processes of course but this appears the simplest and least costly, so the Mond Company have secured the contract. Nickel is very widely distributed but not always in paying quantities. All meteoric iron contains it, sometimes up to 8 or 10 per cent. It is remarkable as second only to iron in magnetism though immeasurably inferior. It got its name from mediaeval superstition. The old German copper miners were always coming across nickel ore in the lodes. It is often associated with copper. As it was useless to them owing to their inability to handle it, they threw it away and in despite gave it the name of the mischievous earth spirit they believe in—"Nickel." Cobalt, it may be remarked, was similarly named from "Kobold," another mythical earth spirit. Nickel now comes largely from Canada where the running of the Canadian Pacific Railway through the district north of Lake Huron disclosed large deposits of nickel sulphide associated with iron sulphide and copper sulphide. Here also occurs a magnetic sulphide of iron which is practically free of copper and nickel. The nickel region at Sudbùrg, Canada, has sharply defined boundaries of a geological nature since all the ore deposits are connected with a great sheet of eruptive rock, roughly boat-shaped. Only the upturned edges of the sheet are exposed since it is basin shaped and has its interior filled with sedimentary rock. The basin is about thirty-six miles long and sixteen miles wide the known ore deposits occurring along the edge of the sheet or less than four miles away from it on projections or offsets.

Forest Panchayats in Madras were first started in 1914 as a result of the recommendations of the Forest Committee, but they have not been as successful as was hoped. In its latest review on the working of forest panchayats published in March last, the Board of Revenue remarked that the good panchayat was the exception, that many were passable while many were bad. Further there are at present 210 forest reserves under the management of 353 panchayats but there are still under departmental management 222 reserves with a total area of over 500,000 acres which are of a class *prima facie* suitable for management by a Panchayat. Probably therefore another 200 or 300 panchayats should be formed in connection with these reserves. It is also possible that panchayats may be formed in connection with the forest village and kancha grazing systems. The Government are anxious that the work of the existing panchayats should be improved and that the system should be extended as soon as possible; they have therefore resolved to place an officer of the Indian Civil Service on special duty for these purposes. His deputation will, in the first instance, be for a period of six months. The officer selected for the appointment is Mr. D. G. Bles, who is due to return from leave in February. On his return, he will report himself to, and work directly under the Chief Conservator of Forests and his headquarters will be at Madras. His first duty will be to examine the working of existing forest panchayats with a view to ascertain the reasons for their success or failure. Three months are expected to be sufficient for this enquiry; the special officer will then submit through the Chief Conservator of Forests a preliminary report dealing with the modifications required in the system as at present applied and the methods by which it can be stimulated and controlled in the future. The report will show the temporary or permanent special staff considered necessary for the reorgani-

zation of existing panchayat and the creation of new panchayats and for their inspection and general in control in future.

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According to information gathered from the *Philadelphia Public Ledger* and sent by H. M. Consul-General at Philadelphia, the development of the motor truck as a commercial freight carrier has attained greater proportions in the industrial territory around Cleveland than in any other part of the country, this being partly due to the impetus given the movement by the establishment of traffic bureaux, and an educational campaign backed by the Cleveland and Akron motor and rubber industry leaders. A daily service is now maintained between Cleveland, Detroit, Pittsburgh, Toledo and Youngstown, which is utilized by manufactures, jobbers and wholesalers as a quicker means of obtaining some materials, and of delivering products. The cost of transport does not greatly differ from that paid the railways when the quicker service is considered. For instance, the rate from Cleveland to Detroit ranges from 1'25 to 1'35 dollars per 100 lb., according to the classification of the goods shipped. Traffic and information bureaux to develop such shipments have been established in Cleveland, Akron, Youngstown, Pittsburg, Cincinnati, Toledo and Detroit, and about fifty other cities in the country. It is also expected that within a short time services will be established to Cincinnati from points in northern Ohio, which will also serve the cities of Columbus and Dayton. It is noted that in shipping goods by motor truck an economy is effected in less expensive crating, and less damage through freight transfers. Another saving arises from supplying more promptly some materials and products needed in rush work, and there is also the convenience of sending shipments from and delivering them direct to the shipping department of plants. The work of developing inter-state truck shipments has been taken up by Chambers of Commerce in

Cincinnati and other cities of that section of the country.

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The Madras Publicity Bureau in a Leaflet says:—The value of the paddy crop to Madras is so great that any possibility of its improvement demands the greatest consideration on the part of everybody from His Excellency the Governor himself down to the humblest cooly for, even if people do not eat rice themselves, an improvement in this crop would have a direct and immediate effect on the prosperity of the country. It is gratifying therefore to learn that work of the Agricultural Department in seed selection is achieving remarkably successful results in the selection of seed paddy. On the basis that it is better to concentrate work at first in districts which offer the greatest chances of success the department have been steadily selecting more prolific strains from the famous Red Sirumani of Tanjore. They have been able to show as a result of the most careful comparison for the last three seasons, on their experimental station at Manganallur, a very considerable increase over the ordinary unselected seed which amounts, to put it at the most conservative figure, to well over 10 per cent. Statistics are confusing and very often inaccurate, and we need not worry our readers by working out exactly what this means in lakhs of rupees. The gratifying point about it is that what can be done with one variety can be done equally certainly with others provided that a sufficient trained staff can be spared for the work. The selection of better strains is not done by magic or inspiration but by careful and laborious work carried on by a trained staff over a series of years.

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The use of X-rays for disclosing defects in materials like steel and timbers was discussed at a recent meeting of the Faraday and Rontgen Societies, presided over by Sir Robert Hadfield who some time ago initiated

experiments in radio-metallography at the research laboratory of his firm at Sheffield. It is claimed that one obvious application of the X-rays is to the examination of metal castings for defects, such as blowholes, which cannot be revealed by external inspection and yet may seriously impair the strength of the finished article. If the castings are not too large, each of them may be subjected to routine testing by the rays and blowholes occurring at regular intervals eliminated. The rays may also be employed to study the effect of adding different quantities of aluminium to steel, and thus ascertain the proportions needed for sound castings. Rough analysis of different steels is also feasible. Mr. Schneider, at whose plant much work in radio-metallography has been carried out, suggested that if a number of carbon-steel and tungsten-steel bars had been accidentally mixed up they might be quickly sorted by means of X-rays, the radiographs obtained with carbon being blacker than with tungsten steel, because the rays penetrate the latter less freely than the former, owing to the lighter atomic weight of the constituent tungsten. At present only a few inches can be penetrated, but great improvements have been made by the Coolidge X-ray tube, and further advances may be looked for not only in this portion of the apparatus, but also in the methods employed for detecting the rays after they pass through the material under investigation, says the *American Machinist*.

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Machinery Market, London, gives the following particulars of a compact and self-contained little electric lighting plant which was exhibited at the recent British Scientific Products Exhibition by Messrs. Arthur Lon and Wrench, Ltd., of 36, Victoria Street, Westminster and Willesden Junction. The engine (of special design) combines in one unit with the dynamo to give the most economical running and ease of erection with

accessibility to all working parts, which, however, are at the same time well-protected and enclosed. The switchgear and starting up is so simplified as to be easily operated by any unskilled attendant. The battery is all complete, fully charged in teak stands of self-contained units, which only require coupling together. The engine is started by turning the handle of a starting switch, which enables the dynamo to act as a motor in starting the engine off the battery. The set is then allowed to run until the battery is fully charged. In case of accidental engine failure, the starting switch is automatically released, preventing the battery from motor-ing the engine and at the same time shutting off the fuel supply. The frequency with which the engine is required to run depends upon the number of lights required, and may vary from one day a week to three days a week, or daily, according to the time the lamps are in use.

The National Industries and Art Works, situated in Malvan District, Ratnagiri, has taken up the manufacture of pen nibs of brass and has sent us a small sample made by machines constructed locally. The manufacture of pens demands the use of fly presses and dyes adjusted with the utmost care in order to avoid ragged edges. It is a severe test for good workmanship. Rolling to the required gauge and hardness, stamping, bending, slitting and tumbling to round the edges have been carried out successfully, and at the final test of writing the pens give good results. Our only criticism applies to the splitting of the point which allows light to pass at the point. This may be due to the nature of the metal, that being less brittle than tempered steel, does not split so readily. Pens corrode much more rapidly in India than in Europe, and although brass may be less affected than steel, it is also softer and more liable to wear at the point. If the makers could obtain strips of the new stain-less steel that resists corrosion they could

produce an article at a little more cost that would commend and be worth a much higher price. A factory that produces pens in India must have unusually accurate methods of work that promises well for further enter-prise.

The net profit of the Mysore Bank for the year ending 31st December, 1919, amounts to Rs. 2, 56,877-2-1 which sum together with Rs. 13,453-13-11 brought forward from 31st December, 1919, aggregates Rs. 2,70,330-13. An interim dividend at the rate of 10 per cent per annum was paid for the half-year ended 30th June, 1919, which absorbed, Rs. 50,000; placed to reserve fund account Rs. 80,000. The directors now propose to pay a final dividend at the rate of 10 per cent per annum for the half-year making 10 per cent for the year ended 31st December, 1919, which will amount to Rs. 50,000: to place to reserve fund making Rs. 1,30,000 for the year and raising the fund to Rs. 5,50,000, Rs. 50,000; to pay a bonus to staff of one month's salary, Rs. 4,450; to transfer to bank property account, Rs. 15,000, to carry forward to next account, Rs. 20,880-13; total Rs. 2,70,330-13. The bank continues to make steady progress, and the directors are gratified to report that the working capital of the bank has increased by 25 lakhs during the year. A branch of the bank has been opened at Ooregaum on the Kolar Gold Fields. The dividend will be payable on and after Monday, 9th February, 1920.

In the Cochin Administration Report for 1919 we read under the head of Industrial Development:—Large schemes of industrial development, due to the initiative of Mr. Bhore, are now before the Durbar. The making of a harbour in Cochin is sure to accelerate the execution of these and many similar schemes. The smaller industries are being investigated by the new Department of Industries which has been

hampered by the want of a full-timed Superintendent, a defect which will soon be remedied. Land is being acquired for starting a porcelain and pottery factory. The cocoanut fibre industry has not yet been scientifically studied. Improvements in the production of yarn and the weaving of it are quite possible. The new industrial life, pregnant with great possibilities, is another argument for the early introduction of compulsory education. Without a preliminary general education, it is impossible to give the requisite technical training that is necessary for the skilled worker.

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It is notified for general information that the Government of India have prohibited the export of Russian rouble notes to all destinations from and after the 17th January 1920, except in the case of rouble notes deposited in a Government Treasury under the terms of the Rouble Note Ordinance of 1919 which may be withdrawn for export under a licence issued by a District Magistrate or Commissioner of Police. Any person obtaining a licence to withdraw notes already deposited by him in a Currency Office or Government Treasury will be permitted to retain them with a view to export for a period not exceeding 10 days. In order to export them he should present his licence with the notes for export either to the Customs Officer or to the Post Office according to the means of export which he desires to use.

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During December 1919, 99 companies were registered with an aggregate authorised capital of over Rs. 35 crores, as against 29 companies with an aggregate authorised capital of over one crore of rupees in the corresponding month of the preceding year. Bengal accounted for 56 companies (over Rs. 10 crores) and Bombay for 24 companies (over 6 crores). For the nine months, April to December, 1919, the number of companies

registered was 634 with an authorised capital of about Rs. 202 crores, as against 187 companies with nearly Rs. 8 crores of authorised capital in the corresponding period of the preceding year. The largest floatation in December was that of Burma Corporation, Rangoon (Rs. 18 crores)

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The Hon'ble Mr. W. W. Hornell, Director of Public Instruction, Bengal, has issued a note with regard to technological education. After reviewing at great length the report submitted by the committees previously appointed, Mr. Hornell concludes:—My conviction is that we should concentrate for a moment on the training of engineer apprentices and that we should approach the Conference with the primary object of deciding the lines on which we can proceed at once to create a technical school in Calcutta, adjusted to the system for training apprentices in railway workshops which will be, with the least possible delay, inaugurated at Kanchrapara.

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According to the *Bulletin of the Federation of British Industries*, Lieutenant-Colonel Battye has been placed on special duty to examine and report on the possibility of a hydro-electric scheme on the Sutlej River, in the neighbourhood of the projected Bhakra Dam, where it is estimated that from 80,000 to 150,000 horse-power should be developed at a reasonable cost. An officer has been also placed on special duty of a similar nature in each of the provinces of Assam, Bihar, Orissa, Bombay, Madras, the Punjab, and the United Provinces.

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Intimation has been received from His Majesty's Secretary of State for India that it is the intention of the Government of Fiji to introduce, at an early date, measures providing for representation on an elective basis of the Indian community in the Legislative Council of Fiji. It is proposed that there

should be two members to be returned by a separate Indian electorate. Details regarding qualifications of the representatives, the basis of the franchise, etc., are under the consideration of the Colonial Government.

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On the recommendation of the Director of Public Instruction, the Government have decided that a senior woman officer should be attached to the Director's office, to advise him on all questions of general educational policy with regard to female education as applicable to conditions in this Presidency. They have accordingly sanctioned the creation, for a period of two years, of the post of Deputy Directress of Female Education on Rs. 300 per mensem, and Mrs. C. M. Drysdale has been appointed to the post.

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The second edition of the Concrete Institute's list of structures and articles in which timber can be replaced by concrete or reinforced concrete is now available for the benefit of Architects, Engineers, Land and Building Owners, Farmers, etc. Copies may be obtained on application to the Secretary, Concrete Institute, Denison House, 296, Vauxhall Bridge Road, London, G.W.I.

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A *Press Communique*, of the Government of India, Department of Commerce and Industry says:—In view of the rise in the rupee sterling exchange the Government of India have decided with effect from the 1st March 1920, to reduce the charge on foreign telegrams to Europe from Rs. 1-4 to Rupee one per word. This rate will be subject to revision once every three months.

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We have no doubt many of our readers will join us in felicitating Rajamantrapravina Diwan Bahadur Jnan Saran Chakravarty, formerly Financial Secretary in this State, on his admission to the degree of Doctor of Philosophy of the Calcutta University. The subject of his thesis was "Agricultural Insurance," which he originally contributed to the pages of this *Journal*.

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It is stated as a result of experiments conducted in the Gundawa Niabat (Kalat) that *gud* (Jaggory) of excellent quality from jowari stalks has been produced.

GLEANINGS.

In February, 1918, the Empire Flax Growing Committee was appointed by the President of the Board of Trade, London, to investigate in all its bearings the question of increasing the supply of flax in the British Empire. The Committee has now issued an interim report on the general situation, in which it is stated, with regard to India, that the Committee has heard evidence regarding experiments in flax-growing, which were made some years ago in Behar, and has received reports of experimental work carried on in other parts of India. The results show that flax can be successfully grown here as elsewhere. There is little doubt that the system of central retting would be necessary to obtain the best results. This, however, necessitates skilled labour and supervision. Unquestionably, the successful development of the industry would also depend upon the services of an expert who would supervise the handling of the crop after it has been gathered, and its proper preparation and grading for the market. The Committee make the following recommendations:—(1) It is undesirable that an industry so important as the British linen trade should remain largely dependent upon external sources of supply for its raw material, especially as the industry has proved to be indispensable in war time. (2) The efforts made by the Government under the necessity of abnormal war conditions to foster the revival of flax growing in the United Kingdom and to extend its cultivation within the Empire have achieved a considerable measure of success, and it is essential that these efforts should be continued until full value has been derived from them.

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The proposal to close down, or at any rate, considerably limit the activities of the Madura Technical Institute, has aroused

much opposition within the town and district of Madura. The Institute had its beginnings in the Industrial School started by the Madura Municipal Council in 1881, and in 1897 was taken over by the District Board. More than 200 students were trained in carpentry, blacksmithy, sheet metal work, art metal and furniture work, wood carving and rattan work during the District Board's management. Government took it up in the latter year, and since then very good work has been done in the dyeing and mechanical workshop sections as well as in weaving. The present recommendations of the Director of Industries involve the virtual closing down of the Institute on the ground that other centres are more suitable than Madura for such an institute. Madras, he thinks, is the best place for a dyeing institute, while for the mechanical section other districts are better situated. On the other hand, a considerable body of opinion in Madura, which has a large dyeing and weaving industry, is against the closing of the school, and the *Madras Times* says, the abrupt termination of the activities of an institution which has done useful work in the past would appear to be a step not to be taken without the most mature consideration.

Some details are now available of the manufacture in Great Britain of cupro-nickel, originally undertaken for the production of smaller arms ammunition and now continued on a large scale for industrial purposes. Electric furnaces are used for the melting of scrap metals, and in one Sheffield works there are over five such furnaces at work, ranging in capacity from 40 to 1,000 kilowatts. The resistance type of furnace has been adopted as best suited to metals which readily burn and vaporise. In this type the heating element consists of a trough lined with a granular material which becomes hot when current is passed through it. The current consumption varies from 300 to 350 kilowatt-hours per ton of yellow brass scrap melted.

One of the 1,000-kilowatt furnaces melts brass at the rate of 2 tons per hour when supplied with 600 kilowatts. When melting zinc, the same type of furnace has a capacity of 200 tons per day and shows only 0.024 per cent of waste metal. These developments suggest that Great Britain intends to play a very important part in the wide field opening up for non-ferrous metals.

Messrs. Tata Sons, Ltd., Bombay, are reported by the *Times of India* to have been negotiating with the Government of His Exalted Highness of Hyderabad, Deccan, for making industrial survey of his Dominions. Messrs. H. P. Gibbs (Managing Director) and B. J. Padshah have, it is alleged, conferred with the Director-General of Commerce and Industries, and with Mr. Palairat, as to the possibilities of mineral products of the country, and proposals are being submitted by the representatives of Messrs. Tata Sons to the Hyderabad Government. The scheme, if sanctioned, will be worked by the Tata Engineering Company.

At the last meeting of the Bengal Legislative Council, the Government indicated the different schemes at present under its consideration for the purpose of advancing technical education in the province. These are the establishment of a technological institute in Calcutta, the training of Foreman Mechanics at Kanchrapara, the expansion of the Government Weaving Institute at Serampore, improved accommodation for Sibpure College, the improvement of the Decca School of Engineering and the improvement of the evening classes at the coal fields.

Among the recent floatations in Bombay there is one called the Bombay Mining Developing Syndicate Ltd., floated to work, especially in Bengal, coal mines, to manufacture by-products of coal and to deal in them in India and abroad.

TOPICS FROM ECONOMIC PERIODICALS.

BRITISH INDIA.

Methods of Representation and Distribution.

We take the following from H. M. Senior Trade Commissioner's Report (Cmd.442):—

The changed conditions brought about by the war necessitate a complete overhaul of our agency and selling methods in India, many of which, owing to the industrial changes in the country itself, are now obsolete.

It is impossible, in dealing with the variety of commodities which make up our vast export trade with India, to make any broad generalisation on this subject, except it be that British manufacturers and exporters will find it necessary to take more and more interest in the distribution of their products than hitherto and to rely more and more on their own distributing organizations in the country rather than upon local mercantile agents.

IRON AND STEEL.

Prior to the war the United Kingdom supplied nearly 60 per cent of India's requirements of iron and steel, and annually shipped over £7,000,000 worth. The trade was a most straightforward one, and in the main was confined to certain standard lines, which were usually sold by United Kingdom manufacturers to the India Office Stores Department, the Railway Purchasing Agents, and also to export merchants in London, who shipped to the large importers at the various ports against cabled indents.

This method was, on the whole, satisfactory, and the large inroads which were being made by Germany and Belgium, particularly in steel bars and channels and plain steel sheets, appear to have been mainly due to the lower prices quoted in those countries rather than to any improved system of distribution. The trade was so standardised that it was not usual to grant sole agencies except in the case of specialities, such as particular brands of manganese steel, Sheffield high-speed and tool steels, etc.

During the war importers in India have established close connections with American steel producers, and the fact that American shipments to India have increased no less than 800 per cent in the four years of war shows that we shall have to adopt more strenuous methods if we are to regain our normal

share of the trade. The United States Steel Products Export Company, which is the selling organization of the Carnegie Steel Company and allied concerns and has the largest producing organization in the world at its back, have well-equipped organizations in Calcutta and Bombay, and, when times become normal, propose to carry large stocks of the staple lines. A further important American steel export combination, including the Bethlehem Steel Company and the Lackawanna Steel Company, has also been formed, and is reported to be devoting its attention to the Indian market, although it will open its own offices or whether it will employ the services of the one or two powerful American merchant houses who have recently established themselves in India.

The competition of the Tata Iron and Steel Company in the wide range of steel products will also require special attention, and it is only a question of a few years before there will probably be at least four firms manufacturing steel on a commercial scale in India.

The recommendations of the Industrial Commission which advocated the appointment of a Controller-General of Stores in India will, if adopted, bring about an entirely altered situation. Under the proposed scheme, all indents for Government stores of all kinds, whether for public works or for State-worked railways, will be carefully scrutinised by the Stores Controller in India, who will call for tenders and place contracts for such articles as can be made in the country. This will mean that, unless British manufacturers and exporters are represented by an active organization in India, the large Government contracts for iron and steel will be secured by Indian producers without any competition whatever, and a most serious inroad will be made into what has, in the past, been a most steady and lucrative business. It has not yet been definitely decided, although representations are being made on the point, whether the Controller-General in India will be authorised to place contracts with the local branches of approved British manufacturers. This is a step which would be urgently called for in the interest of United Kingdom producers. It would provide a great stimulus to our industrialists to open their offices in India, and would compensate existing branches of firms for their initiative and foresight.

RECOMMENDATIONS.

In view of the circumstances outlined above, the following definite recommendations are made:—

- (a) British steel producers who have in the past conducted a large and steady trade with India in the staple lines of steel

rails, sheets and plates, bars and channels, angles and springs, beams, tubes, hoops and strips, cast pipes and fittings, etc., etc., whether for the use of Government works or for the industrial requirements of the country, should take steps to form one or more export selling organizations of non-competing manufacturers, and should open their own offices in Calcutta and Bombay for the sale of their products, from stock in the case of articles in constant demand.

- (b) The smaller manufacturer of standardised lines such as tees and angles, bars and channels, spring steel, etc., would probably be well advised to continue to deal with the many old established London and Glasgow metal exporters, who usually have connections in the principal Indian centres and who would be able to amalgamate the multiplicity of small bazaar indents into one substantial order, and would furnish cash against documents in London.
- (c) The British metal export merchant with an established trade with the Indian bazaars would do well to maintain a resident representative on the spot. The tendency all over India is for the buyer to prefer to have personal dealings with the actual seller rather than to conduct his business by letter or cable with a buying agent in the United Kingdom.
- (d) The higher-grade Sheffield specialities such as high-speed and tool steels, files, etc., require special treatment. In this case, inasmuch as most Sheffield makers produce the whole range of these articles, group-selling would be found to present difficulties. The best method would be to appoint an active firm of import merchants to act as sole agents in each of the following territories: Calcutta, to cover Bengal, Bihar and Orissa, United Provinces and Assam; Bombay, to work the Bombay Presidency, Sind and the Punjab; Madras, to cover Southern India; and Rangoon, for the whole of Burma.

MACHINERY AND MILLWORK.

Before the war, 89 per cent of the machinery imported into India was obtained from the United Kingdom, and competition was confined to a certain amount of flour and rice-milling machinery, electrical plant, etc., derived from Germany, and relatively

small quantities of mining and oil-crushing machinery from the United States. British makers usually sold their productions in London to Government, railway, and industrial purchasing agents against cash, or, in certain cases, appointed firms of engineering importers in the Indian ports as their sole agents. It was only in exceptional cases that the British manufacturer had his own office and staff of engineers on the spot, but it should be noted that, even before the war, this method of representation was becoming increasingly popular.

My advice to British engineering manufacturers who already have a large interest in this market is that they should open their own office and selling organization on the field in those cases where the trade to be gained warrants the expense, and in other cases they should form group-selling organizations in conjunction with other manufacturers of non-competing lines, and the group association should then open its own offices in Calcutta and or Bombay as circumstances direct.

The reasons on which this opinion is based are given in the Report.

MOTOR CARS.

The British maker has three main forms of representation and distribution open to him. In the first place, if he is desirous of specialising for the market and is willing to sink a certain amount of capital without looking for an immediate return, there is no doubt whatever that the most satisfactory plan is to open his own depots at four main distributing points, viz :—

- (a) *Calcutta*, to cover Bengal, Bihar and Orissa, Assam, and Burma. The number of cars registered in these districts in 1918 was as follows: Calcutta, 4,695; Bihar and Orissa, 888; Assam, 236; and Burma, 1,827—a total of 7,646.
- (b) *Bombay*, to cover the Bombay Presidency, Karachi and Sind, and Nagpur (Central Provinces). The number of cars registered in this area was: Bombay, 4,540; Karachi, 324; Nagpur, 370—a total of 5,234.
- (c) *Madras*, to cover the Madras Presidency and the large Native States of Southern India. The number of cars registered was: Madras Port, 2,125; other parts of Madras Presidency, 737—a total of 2,862. Although this total is less than the former ones, the prospects for Madras as a centre are particularly good in view of the proximity of the large Native States of Mysore and Travancore and the increasing use of cars by the planting community

- (d) *Lahore*, to cover Punjab, United Provinces, North-West Frontier Province, and Rajputana. The number of cars registered in this district was: *Lahore*, 1,171; *Allahabad* (United Provinces,) 1,359; *Delhi*, 78; *Peshawar*, 316; and *Ajmere*, 14—a total of 2,938.

SUGGESTED SELLING ORGANIZATION.

Each of these depots should be provided with a stock of chassis and spare parts, and a well-equipped garage and workshop for the execution of all repairs and body-building. They should be staffed by a trained sales manager in charge, three or four European mechanics, trained in the home works, who would act as engineers and train the native mistries, and two good salesmen, who should continually tour the district. The provision of the most efficient service as regards spare parts and repairs is a *sine qua non* of success, as the sale of cars in up-country India is mainly retarded by the present impossibility of speedily securing spare parts and repairs. If this service is provided in an efficient manner, a very great expansion in the sale of cars is inevitable.

In addition to the four main depots agents should be appointed in other centres such as Cawnpore, Allahabad, Rawal Pindi, Pashawar, Delhi, Bangalore, Nagpur, Secunderabad, Rangoon, etc., etc., so that every centre of importance in India may be covered.

This may appear, at first sight, to be an ambitious programme; but it must not be taken as a counsel of perfection, but as the minimum which is necessary adequately to work this market, and the proof of this is that one or two British companies are already contemplating taking action on these lines. The extent of the expansion in the sale of motor cars in India will depend largely on the facilities given by the sellers. Motors are becoming a necessity in every centre, not only in large cities but also on plantations and for work in the districts. The main roads throughout the country are excellent, and it is possible to motor comfortably between most of the main cities, even though—as in some cases—they are 1,000 and more miles apart as, for instance, Bombay and Calcutta, or Calcutta and Delhi.

Secondly, should a manufacturer not possess the facilities or financial strength to effect his own distribution, I would recommend that he either nominate one of the well-known motor importers as his sole agents in India or else appoint a good house in each centre.

A third method which might suit some makers, and which would have the advantage of relieving the manufacturer from financial responsibility, would be to appoint a certain prominent British merchant

firm in London and Glasgow, with wide-spread connections throughout India and the highest financial standing as their general agents for India.

OTHER IMPORTS.

The Report also deals exhaustively with the methods employed in the importation of the following lines, together with suggestions for improved methods in each case:—

Railway Rolling-Stock and Plant, Electrical machinery, Prime Movers (other than Electrical), Agricultural Machinery, Boilers, Machine Tools, Mining Machinery, oil-Crushing and Oil-Refining Machinery, Paper Mill Machinery, Rice-Milling Plants, Flour Mill Machinery, Saw-Mill and Woodworking Machinery, Textile Machinery, Typewriters, Pumping Machinery and Waterworks Plants, Light Railway Material, Mill Stores, Planters' Stores, Stores for Oil-Mills and Oil Refineries, Liquors and Provisions, Motor Lorries, Motor Cycles, Articles of Apparel, Haberdashery, Boots and Shoes, Heavy Chemicals, Drugs and Medicines, Dyestuffs, Paper and Pasteboard, and the Bazaar Trade.

ECONOMIC NOTES.

INDUSTRIES AND COMMERCE.

Industries of Western India.

The following are extracts from the Annual Report of the Director of Industries of the Bombay Presidency for the year 1918-19:—

HAND-LOOM WEAVING.

The main work of this section is the demonstration of the use of fly-shuttle looms and their introduction amongst the weavers, chiefly through the medium of weaving schools. These improved looms are now in use in large numbers in many weaving centres, and the success of this line of work, of which the credit is due to the Registrar of Co-operative Societies, though limited, is undoubted. I do not entirely share my predecessor's views that the weaving schools are not the most economic arrangements possible, and that they should be run by local bodies with the assistance of grants-in-aid. I have asked for sanction to introduce the method of popularizing fly-shuttle slays through demonstrators who will earn commission on each new slay which they introduce. But I understand that in another province the method of short time demonstrations has shown the defect that at the first difficulty which arises the weaver is strongly inclined to

abandon any new mechanical contrivance and revert to his old methods, unless there is some one on the spot to help him. The weaving schools certainly overcome this difficulty and train the younger men in proper methods.

The introduction of improved mechanical appliances is the only profitable line of advance in the hand-loom industry at the present time. Imported healds, reeds, shuttles and pirns are now used in the schools and their advantages over the country-made articles are sufficient to have induced an increasing demand for them by the weaving population.

Experiments with a warping and sizing machine and a contrivance for producing solid silk borders were made at Dharwar but with no very definite results. The warping and sizing machine is unsuited to the individual weaver, but may be profitable to small factories employing a number of weavers and the plant will be tried further at Bhiwandi with the object of testing it for this purpose.

The dye market has again given trouble during the year to the weavers.

POTTERY.

During the year Mr. Fern (Superintendent of the pottery section of the Sir J. J. School of Art), resurveyed the red clay resources at Kurla for the new demonstration factory, and visited the Lakhtar State in Kathiawar to select a fire clay for the manufacture of the bricks required for the furnaces in the new factory. These will be prepared at the School of Art by the students under Mr. Fern's superintendence. He also visited the Ahmedabad district and advised a local syndicate regarding the working of its kaolin deposit. A large deposit of china clay in the south of the Presidency is also under investigation, and arrangements have been made for refining a one-ton sample for test as a sizing material in a local mill. Mr. Fern also inspected the manufacture, for the Irrigation Department, of pipes for land drainage in the districts of Nasik and Poona, and gave advice.

The scheme for the Demonstration Pottery Factory has been submitted for sanction, but further progress is barred, at the moment, pending the completion of the scheme for industrial development at Kurla and Kiroli in Salsette. The site of the new factory has required careful consideration, and it has now been decided that it should be located, if possible, on one of the railway sidings in the new industrial area. Its exact position is therefore dependent on the scheme of development finally adopted.

OILSEED CRUSHING.

The Department has done nothing directly to assist this industry, with the possible exception of despatching a sample good groundnut cake to the

Indian Trade Commissioner in London for obtaining the opinion of an important firm of biscuit manufacturers on the possibilities of developing the manufacture of nutramine. Nothing practical has resulted from the information hitherto published by the Department regarding the value of this foodstuff, nor is anything likely to result so long as the available plant in India is unable to reduce the oil content of groundnut cake to the limit of five per cent prescribed by Mackenzie Wallis who conducted the investigations and brought his results to public notice.

In India there is ample crushing power to meet all internal requirements of vegetable oil, and failing new internal demands an expanded oil industry must look for new markets abroad. The controlling factors here are the comparatively small demand in India for oil cake and the fact that a foreign market requiring both the oil and the cake naturally imports the seed and crushes for itself; the economy in containers and railway and ocean freights is obvious. The protectionist may suggest export duties on the seed, but, unless the seed is an Indian monopoly without a substitute, this course means loss to the agriculturist and no likelihood of a larger market for the industrialist.

The expansion of the industry virtually depends on the rate at which the Indian agriculturist can use increasing quantities of cake for fodder and manure, and this leads into problems which are the special work of another department. Given a better Indian market for the cake, new outlets would probably arise for the oil, for example, in an expanded soap industry.

Whether the efficiency of the industry can be improved is another question. On the large scale a combination of cage presses with an extraction plant seems feasible. For certain seeds the rotary *ghani* is hard to beat, and it is probable that with better mechanical equipment the village oilman can still prosper. In this connection, the possibility of improving the quality of the oil from village presses may be worth investigation.

CASEIN MANUFACTURE.

War demands led to an investigation of casein manufacture. An investigation of this kind must necessarily take time. The present position is that a large sample of sulphuric casein prepared by Dr. Meldrum has been sent to the United Kingdom for a report. I am also in correspondence with the Indian Trade Commissioner in London regarding technical and other assistance which may be expected from certain sources. Casein is not a new industry in the Presidency, but it seems capable of technical improvement and expansion, and two or three firms or individuals of standing are interested

in its possibilities. As in the case of vegetable oils market difficulties may ultimately prove more formidable than technical problems. The present market cannot be maintained forever, and when old sources of supply are fully reopened the position may be very different. My enquiries show that some time before the war one enterprising Indian studies the industry carefully in England, Europe and America, but the market collapsed for a considerable period, so that no amount of technical skill could, at the time, establish the industry on a paying basis in India. The technical uses of casein are, however, now rapidly increasing and likely to absorb an increased output.

Dr. Meldrum is also experimenting on the production of casein from separated milk by the method employed in France of using an electric current. He has also made preliminary experiments in the manufacture of gallalith. Mr. Mackenzie Wallis had begun an investigation of the manufacture of casein cement for aircraft purposes, and though this has not been definitely restarted, it has been found easy to produce glue of good quality. There are now good prospects of locally made casein becoming the basis of further local industrial development.

BITTERNS.

There are two or three schemes for the establishment of new chemical industries near Bombay regarding which the Department has been consulted on various points. The chief scheme with which the Department is actively concerned is the utilization of the bitterns at Kharaghoda which Mr. Mead described as the prime subject of investigation last year. The Pioneer Magnesia Company has improved and extended its premises, installed a railway siding and loading platform and is arranging to purchase a motor rail wagon with a tank and pump in order to bring the crude bitterns from the pans to the factory. An improved process of manufacture was devised by Mr. Mackenzie Wallis and the necessary plant designed by Mr. Dawson. A new agreement with the Company provides that it should make a trial on a large scale of the manufacture of magnesium chloride and magnesium sulphate by the new method. It is hoped that experience will prove that it is advisable to multiply the new plant. The objects of the new process are a greatly improved production of magnesium chloride, economy of fuel and the full recovery of by-products of good quality. The new experimental plant is now ready and will be worked next season. The by-products will be obtained by treating the sludge from the chloride vats with sulphuric acid so as to convert the chloride in the sludge into practically pure magnesium sulphate; the hydrochloric acid set free in this process will be

utilized for the production of zinc chloride. Laboratory experiments on this subsidiary process have proved successful, and the Pioneer Magnesia Company is ordering a small manufacturing plant, which, if successful, will be replaced by a large plant.

The whole experiment, which is under the control of Mr. Turner, has also been arranged with a view to testing the bitterns as a possible source of bromine, and arrangements have been made, through the Indian Munitions Board, for sending next cold weather a complete range of samples of brines, bitterns and crude and refined salts to England for independent analysis.

Similar investigations will be instituted regarding the possibilities of manufacturing magnesium salts and extracting bromides at Aden, and when Mr. Turner, who is controlling this investigation also, has completed it, the results will be submitted to the Indian Munitions Board. The investigation has been delayed by difficulties incident to obtaining a full range of samples and by the illness of the assistant chemist under Mr. Turner. The possibility of producing bromine and bromides depends on market conditions to a peculiar degree. The supplies from Germany and America are ample, and prices in the past have fluctuated over a long range in a manner dependent entirely on whether the manufacturing organizations in Germany and America were competing or selling in agreement. The question of obtaining bromine supplies within the Empire was raised during the war, and the establishment of a bromine and bromide industry within the Empire will probably depend more upon imperial policy than mere industrial and commercial factors.

RESIN AND TURPENTINE.

Of other subjects referred to by Mr. Turner, mention may be made of the oleo gum resin of *Boswellia serrata* to which a reference was made in last year's report. Laboratory work, which was delayed for want of suitable apparatus, has now begun. A similar investigation is also in progress at the Indian Institute of Science, Bangalore, and it is believed that private enterprise is also investigating. The turpentine produced is of good quality but the resin is not so good and the gum is practically valueless. If an improved gum can be produced the crude resin could probably be exploited with profit.

GLASS.

The glass factories were heavily handicapped in the earlier part of the year by difficulties in obtaining coal, and at a meeting of their representatives with Mr. Mead, arrangements were made in consultation with the Coal Controller for a minimum supply of coal to keep in working order furnaces which were

engaged on orders from Government and public bodies. Nevertheless, some factories had occasionally to close altogether for want of fuel and raw materials. Mr. Dawson gave one factory aid in working useful plant which had been lying idle. Recently the Director of the Geological Survey has accepted proposals for a survey of the sands in the Presidency, suitable for glass manufacture, and this will be made in the cold weather. A conference will also shortly be held with representatives of the industry to discuss what measures can be adopted for its assistance. Here, again, it is not the difficulty of making glass but the difficulty of meeting foreign competition which has to be overcome, and probably the first step is for the Department to devise a casting system and arrange for its introduction in one or two factories with the object of ascertaining what the economics of the industry really are. Bombay City, where no less than six glass factories are now located, is far from the Indian sources of sand and coal, and has not the protection against foreign competition which is afforded by railway freights to a place like Allahabad which has sand at its door and coal nor far distant.

THE HIGH PRICE OF SUGAR.

Sugar-cane Production in India.

The *Topical Life* writes:—

Dr. C. A. BARBER, the Indian Sugar Expert, may wish to claim "that India does not produce sugar," but he surely cannot deny that India can and does produce wonderfully fine sugar-cane, and after all it is the cane that we want. Let us have plenty of good cane with a big yield of juice, and we will undertake that whether the Indian Government sugar expert (this term, by the way, must be a misnomer if India does not produce sugar) calls sugar by any other name or not, sugar as produced outside of India could be, and would be, produced in large quantities in India itself. If this can be, why write to the *Times* and to the *Confectionery Journal*, and perhaps to other papers, and tell the man-in-the street that "the fact that India does not produce sugar would come as a surprise to such a reader, i. e., the ordinary reader." This, the *Confectionery Journal* says, is hair-splitting with a vengeance, unless it is a joke, for of course the ordinary reader and every one else with whom we have discussed Dr. Barber's article (*Times Trade Supplement* of August 30th) are more than surprised to be told such a tale. "Sugar or no sugar," retorted

one man, "India can produce sugar-cane, and that's good enough for me."

We are reminded of these little conversations by another excellent article in the *Mysore Economic Journal* on The Sugar-cane Industry. This time we are shown the canes growing, firstly the Red Mauritius Cane in the Southern Arcot of the Madras Presidency, and then, further on another full-page illustration of "Thick Cane." The article by Subba Ayyar, M.A., L.T., is, we note (not on sugar production, but on "The Sugar-cane Industry," and the author tell us: "The constantly increasing consumption of sugar in all countries of the world and the complete cessation of the imports of beet-sugar from Germany and Austria have given an impetus to the Indian industry. Therefore, the question is being freely discussed as to whether India can take advantage of the present opportunity and grow sufficient sugar-cane to meet the needs of home consumption, and also become an exporting country as she once was." Exporting of what? Why, of sugar; that is, not sugar-cane. Why, therefore, lead people to believe that India "does not produce sugar" as we claim she can and does?

If India could only obtain two tons of sugar, *gur* or whatever name is given to the final product instead of one or less than one ton as now, India could export sugar, judging by the rapid progress made in at least one district with the Red Mauritius cane, until to-day it is impossible to see any tract round the Nellikuppam Factory growing the old (thin, whitish) cane, as then sugar production in India should go ahead, for Mr. Ayyar says: "The ryots are perfectly satisfied with the thick red Mauritius kind. Thus we see that the Indian ryot is not, after all, so hopelessly conservative. He evidently understands his business; and is not slow to give up his traditional ways if only he is satisfied with the results of new experiments." This endorses, and more than endorses, all we urged, and if we can be pulled up and "censored" by Dr. Barber, and told that in face of our claims it is time that authoritative account be given of the case, "we shall now watch for Dr. Barber to "go for" Mr. Subba Ayyar, as he appears to us to be far more optimistic of India as a sugar producer and even exporter than we were in "The High Price of Sugar." Already two steps up the ladder of success are chronicled, viz., three-roller iron mills have replaced the old wooden mills, whilst step No. 2 is the realization that charges would be reduced, and more sugar obtained if Rs. 12,000 mills (pre-war rate) capable of working 100 acres of cane were generally used. Since this is acknowledged, surely the mills will soon be sent when prices come down, for, as Mr. Subba Ayyar claims,

"The ryot is not slow to give up his traditional ways if only he is satisfied with the results of new experiments."

It is, of course, absurd to say India does not produce sugar. The word sugar, as Sir George Watt we feel sure would tell you, comes from the Sanskrit *sarkara*, and that name occurs in the Athervaveda, one of the oldest classics, and it there means white or crystalline sugar. The most general modern derivation from that is *Sarkar* or *Shakar*, the universal name for, and direct origin of, the English word sugar. The word *Khanda* is also very ancient and sugar-candy comes direct from the Indian *Sarkar-Khandi*, and both in India and England means the same special form of sugar. *Guda* and *Gula* are the classic forms of the word *Gur* and means unrefined sugar. Besides all this we have at the present moment 2½ million acres under sugar-cane, and prior to the arrival of beet-sugar we had nearly twice that acreage of cane. India might supply the world with sugar as it did in the early days of the British imports of sugar. Moreover, we have in India some half a dozen independent sources (materials) of sugar, and palm sugar gives us the words Toddy and Punch. No part of the world is more closely connected with sugar than India. Why therefore say it is a fact that India does not produce sugar, as Dr. Barber claimed in the *Times Supplement* of August 30th (see *TROPICAL LIFE* for September, p. 146).

* See "The High Price of Sugar," price 1s. 3d., post free, p. 8, and elsewhere.

AGRICULTURE.

An Indian Agricultural Society.

The Government of Madras, Revenue (Special) Department, have issued the following letter and enclosure, which, we reproduce below, for general information.

Letter dated, Fort St. George, 5th December 1919.

The Government of India have recently been considering a scheme for the formation of an Indian Agricultural Society with objects generally similar to those of the Royal Agricultural Society of England. As you are aware, one of the results of the Reform Scheme will probably be to make agriculture a Transferred Subject, and, although it is proposed to maintain central institutes for purposes of research, agricultural development will, in the

future, depend very largely upon Provincial initiative. In the altered conditions, it will be useful to form an organization of a *quasi* non-official character at the Head-quarters of the Government of India, which will, by keeping in touch with the Government of India and by having branches in the provinces, be a co-ordinating link in agricultural development. The proposed Indian Society would not be affiliated to the Royal Agricultural Society in England, but the latter Society is in favour of the proposal, and would be prepared to furnish any information required and to give any assistance possible. It has been suggested that Provincial Societies should be formed, with separate funds and organization, and that there should be a Central Council, comprising: (a) A few nominated officials, (b) Governors and Members elected by the Provincial Society in proportion to their membership, and (c) Life Governors and Members elected by the Central Council. The Central Council might be financed by a small levy on the Provincial Societies and maintain a paid Secretary, and this Federation would then constitute the Indian Agricultural Society. The functions of the Central Council would be to co-ordinate the activities of Provincial Societies and advise them generally, and the objects of the Provincial Societies would be those indicated in the Provincial prospectus which forms an enclosure to this letter. It is believed that zemindars and landholders would welcome a scheme of this character, and would warmly support it.

I am to request that the Government of Madras may be favoured with the view of the Association, (i) on the proposal thus to form a non-official body or bodies whose function would be the encouragement of agricultural research and development, and (ii) on the suitability of the scheme outlined above. If possible, some indication may be given of the extent to which private endowments or benefactions and subscriptions for governorships and memberships are likely to be forthcoming in this Presidency. It is requested that a reply to this reference may be sent by the 15th January, 1920.

PATRON.—His Excellency the Viceroy.

CENTRAL COUNCIL.—Comprising:

NOMINATED OFFICIALS—Hon'ble Member, Revenue and Agriculture Department. *Chairman*
Secretary, Revenue and Agriculture Department. *Agricultural Adviser.*

ELECTED.—

Governors.

Members.

Branches to be organized in the provinces on similar lines, the Head of Province as Provincial President.

Governors and Members elected by Provincial Societies to hold office on the Council for three years, one-third retiring each year.

Life Governors and Members of the Society to be elected in unlimited numbers at meetings of Council.

ANNUAL SUBSCRIPTIONS.

	Rs.
Governors	75
Members	15

Life Governors and Members may compound their annual subscription for Rs. 750 and Rs. 150, respectively.

OBJECTS.

The general advancement of agriculture in India and in particular :—

- (1) To embody and republish in the vernaculars such information contained in Agricultural publications, and in other scientific works, as has been proved by scientific experiment and practical experience to be useful to the cultivators of the soil ;
- (2) To correspond with agricultural, horticultural and other scientific societies, both in India and abroad, and to select from such correspondence all information which, according to the opinion of the society, may be likely to lead to practical benefits in the cultivation of the soil. The correspondence with foreign societies will be the function of the Central Council, and the selection of information likely to be useful in its own provincial circle will rest with the local society ;
- (3) To pay to any occupier of land, or other person who shall undertake, at the request of the society, to ascertain by any experiment how far such information leads to useful results in practice, a remuneration for any loss that he may incur by so doing ;
- (4) To encourage the scientific study of the following matters, *viz* (a) the improvement of agricultural implements, (b) the construction of farm buildings, (c) the application of chemistry and manures to the general purposes of agriculture, (d) the destruction of insects injurious to vegetable life, (e) the eradication of noxious plants, and (f) the care and eradication of plant diseases ;
- (5) To take measure for the improvement of the education of those who depend upon the cultivation of the soil for their support, either by the establishment of model rural schools, both elementary and secondary,

or by encouraging the production of trained teachers for such schools, or otherwise ;

- (6) To take measures for developing the appreciation of veterinary science as applied to horses and agricultural stock ;
- (7) At the meetings of the society in the provinces, by the distribution of prizes and by other means, to encourage the best methods of cultivation, dairying and breeding live stock ;
- (8) To promote the comforts and welfare of labourers ;
- (9) To encourage the re-grouping of scattered holdings, and the formation and maintenance of economic holdings ;
- (10) To encourage the spread of co-operation among cultivators.

METHODS.

Awarding medals, prizes, life certificates, memberships, scholarships and diplomas upon the results of annual examinations in agriculture, publishing a journal giving the results of the society's activities. Advising generally on all agricultural matters.

SERICULTURE

Silk and Silk Waste.

Japan and China in normal times supply approximately 66% of the world's production, Italy and France 19%, and the remaining countries 15%. The world's crops have advanced steadily from some 15 million kilos. in 1892 to 27 million kilos. in 1913. Almost the whole of the increase has been secured by Japan and China, the former country having surpassed the latter in each year since 1909. It is calculated that the Japanese crop is increasing at the rate of 10% per annum, and whereas 40 years ago Japan produced only some 7,000 bales of indifferent silk, she is now able to export some 1,50,000 bales of silk of excellent quality, of the value of approximately £30,000,000 sterling. Between 60% and 70% of the Japanese crop is exported annually to the United States of North America. The European production has remained

practically stationary, and the supplies from the Levant have doubled, but only represent a small proportion of the whole, says the *Statist*.

The following figures, taken from the Report on the Textile Trades issued from His Majesty's Stationery Office in 1918, will show the production and consumption for the year 1911 :—

Production and Consumption of Silk for the Year 1911.

		Production Kilos.	Consumption Kilos.
France	..	512,000	4,342,000
Italy	..	4,109,000	1,150,000
Switzerland	..	18,000	1,661,000
Spain	..	82,000	133,000
Austria	..	217,000	807,000
Hungary	...	135,000	...
Russia and Caucasus	...	480,000	1,440,000
Balkan States	...	201,000	25,000
Greece	...	60,000	25,000
Salonica and Adrianople	...	346,000	40,000
Germany	...	...	3,562,000
Great Britain	...	...	629,000
America	...	...	9,551,000
Broussa, Persia, Syria and Turkestan	...	1,789,000	200,000
China	...	5,379,000	..
Canton	...	2,390,000	..
Japan	...	8,644,000	..
India	..	236,000	641,000
Tonkin	..	15,000	..
Egypt, Morocco, Algeria and various	..	..	405,000
Total	...	24,613,000	24,584,000

The figures for China, Canton, and Japan are the exports. The internal consumption of these countries is enormous, but there are no reliable figures which would enable us to know what these really amount to. It will be observed from the table that Germany does not produce raw silk, but ranks second among the consuming countries of Europe, being only surpassed by France. Austria-Hungary produces a fair quantity, but the total does not amount to one-half of her consumption. Turkey in Asia is the only country with a considerable supply in excess of consumption. In order to ascertain the value of the silk industry in the United Kingdom we have to turn to the Census of Production which was made in 1907. This gives a figure amounting to 5½ millions sterling as the total value of the silk industry. The

trade in raw silk from India has, as we showed some time ago, decreased very seriously during the last 50 years, largely in consequence of the deterioration of the Bengal cocoon and inferior reeling. At the present time the main quantities of the best qualities of Indian silk are grown in Kashmir, where sericulture is a State monopoly. Kashmir produces each year about 1,400 bales of 150 lb. each. This silk is grown on the Himalayan hills, at an altitude of 6,000 feet. It is a regular well-reeled, thread and although weaker than the Italian silk, compares favourably with the Japanese qualities. The greatest care is taken by the authorities in Kashmir to prevent disease in the cocoons. The seed for its production is imported year by year from France, and reproduction is not allowed, the object being to prevent the growth of disease. Part of the silk is reeled within the borders of the State, but there is a considerable export trade to Italy, though there seems no reason why the whole of the season's crop should not be reeled in Kashmir.

We hope at some future date to deal with the prospect of extension of sericulture, particularly with reference to an increasing production of silk within the confines of the British Empire.

We will confine ourselves to day, however, to showing the importance of the silk industry in the United States of North America. Below we publish a table, for which we are indebted to the National City Bank of New York, showing the imports of raw silk into the United States of North America since the year 1860.

According to a report compiled by the National City Bank of New York, the silk factories of New York are now turning out products valued at approximately £100,000,000 a year, against £20,000,000 in 1900 and £50,000,000 a year at the beginning of the War. Equally interesting is the growth in exportation of silks, which in 1900 amounted to only a trifling sum, while for the year 1916 it amounted to approximately £4,000,000 sterling. There are as yet no census figures of the silk manufactures in 1918, but an approximate estimation of the growth of the industry can be had by taking the value of the raw silk imported in the census years, with the stated value of the silk manufactures turned out in those years which indicates that the output of the factories averages about two and a-half times as much as the import value of the silk used, and as the value of the raw silk imported in 1918 is nearly £40,000,000 sterling, it may be assumed that the silk manufactures turned out in that year were approximately £100,000,000 against £50,000,000 in 1914 and £21,000,000 as shown by the census of 1900.

Fiscal Year	Lb.	Price	Value
		per Lb. \$	\$
1860 ..	298,000	4'50	1,341,000
1870 ..	584,000	5'17	3,018,000
1880 ..	2,562,000	4'68	12,025,000
1885 ..	3,424,000	3'63	12,422,000
1890 ..	5,943,000	3'92	23,285,000
1895 ..	7,975,000	2'76	22,029,000
1900 ..	11,259,000	3'96	44,550,000
1901 ..	9,140,000	3'21	29,354,000
1902 ...	12,621,000	3'31	41,714,000
1903 ...	13,637,000	3'59	49,003,000
1904 ...	12,631,000	3'52	44,462,000
1905 ...	17,812,000	3'34	59,543,000
1906 ...	14,505,000	3'64	52,856,000
1907 ...	16,722,000	4'20	70,230,000
1908 ...	15,424,000	4'13	63,666,000
1909 ..	23,334,000	3'37	78,831,000
1910 ...	20,363,000	3'21	65,425,000
1911 ...	22,380,000	3'25	72,714,000
1912 ...	21,510,000	3'11	67,173,000
1913 ...	26,349,000	3'15	82,148,000
1914 ...	28,595,000	3'42	97,828,000
1915 ...	26,031,000	3'09	80,532,000
1916 ...	33,071,000	3'61	119,484,000
1917 ...	33,869,000	4'61	156,086,000
1918 ...	34,448,000	5'25	180,906,000

EDUCATION.

Public Instruction in Madras, 1918-19.

The following Government Order No. 1541, Home (Education), dated 12th December, 1919, has been issued by the Government of Madras:—

2. *Imperial grants.*—In addition to grants aggregating Rs. 21'70 lakhs sanctioned in previous years, the Government of India sanctioned during the year a further recurring grant of Rs. 5'5 lakhs for the development of elementary education. The grant has been utilized towards the opening of additional elementary schools under local bodies, the raising of the minimum pay of teachers in elementary schools under public management, the appointment of additional inspecting officers and increased teaching grant to aided elementary schools.

3. *General statistics of progress.*—The total number of educational institutions—public and private—increased by 117 or 0'3 per cent, but their strength decreased by 0'2 per cent. The fall in strength was mainly in the institutions classed as

private. In schools for Indians, there was an increase of 2'3 per cent in the number of students receiving secondary education, but the number receiving collegiate and elementary education decreased by 0'2 and 0'05 per cent respectively. The outbreak of influenza in a virulent form in all the districts of the Presidency during the year probably accounted for the decrease in attendance.

4. *Total expenditure.*—The total expenditure on education from all sources during the year amounted to Rs. 248 lakhs against Rs. 226.4 lakhs in the previous year. Of this sum, Provincial funds contributed Rs. 111'13 lakhs, Local and Municipal funds Rs. 21'11 lakhs and fees and other sources Rs. 115'76 lakhs, the corresponding figures for the previous year being Rs. 96'10 lakhs, Rs. 20'50 lakhs and Rs. 109'84 lakhs respectively. The percentage of expenditure from public and private funds to the total outlay on education were 53 and 47 per cent as against 52 and 48 per cent respectively in the previous year.

The total direct expenditure increased by nearly Rs. 15 lakhs and the indirect expenditure by about Rs. 7 lakhs. The expenditure on secondary and elementary schools from public funds amounted to Rs. 67'86 lakhs or Rs. 8'37 lakhs more than in the previous year, and the major portion of the expenditure (Rs. 58'51 lakhs) was incurred on elementary schools. The grant-in-aid from Provincial funds to institutions under private management increased from Rs. 33'52 lakhs to Rs. 38 lakhs. There was a slight increase in the grants from local funds, while those from municipal funds fell from Rs. '56 lakh to Rs. '39 lakh. The average annual cost of education per head of the population was nine annas seven pies against eight annas nine pies in the previous year.

5. *University and Collegiate Education.*—The Regulations of the Madras University were completely revised during the year. The University opened classes for the Diploma in Economics and also arranged for the delivery of special lectures by Messrs. G. A. D. Stuart, I.C.S., F. R. Hemingway, I.C.S., G. T. Boag, I.C.S., Professor R. Muckerjee of the Calcutta University and Dr. John Mathai.

The Ceded Districts College, Anantapur, was made permanent and its status raised to that of a first-grade college. First and second year (Intermediate) University classes were opened at the Government Madrasa-i-Azam, Madras. There was a marked increase in the strength of the professional colleges, the largest increase being in the Law College.

6. *Secondary and Elementary Education.*—During the year, the Government sanctioned subsidies to local bodies to enable them to open 49 middle

schools and also to raise the status of 17 existing schools under their management. Owing chiefly to this measure, the total number of secondary schools for boys rose by 63. There was also a satisfactory increase of 2.1 per cent in the strength of the institutions.

The number of elementary schools for boys increased by 90 or 0.3 per cent, but there was a decrease in their strength by 9,115 or 0.72 per cent. The decrease was mainly in the schools under private management. The Government sanctioned during the year subsidies to local bodies for opening 1,170 additional elementary schools for the benefit of all classes. The minimum pay of trained teachers in boys' schools under public management has been raised from Rs. 11 to Rs. 12 per mensem.

7. *Special education.*—The number of training schools for masters rose from 62 to 66 and their strength from 4,226 to 4,554. The Civil Engineering School, Vizagapatam, and the Institute of Commerce, Madras, were opened during the year.

The number of pupils on the rolls in the School of Arts and the School of Commerce, Calicut, fell by 31 and 12 respectively.

8. *Female education.*—The Queen Mary's College for Women, Madras, was placed on a permanent footing and two new secondary schools for girls were opened during the year. There was further satisfactory progress in the education of Indian girls. The number of schools intended for them rose by 234 and the number under instruction by about 11,000. The Government sanctioned subsidies to local bodies for opening 432 additional girls' schools and for raising the minimum pay of women teachers in girls' schools from Rs. 12 to Rs. 13 per mensem. The strength of the three colleges for women increased from 195 to 208, of whom 103 were studying in the Queen Mary's College and 96 in the Madras Christian College for Women.

9. *European education.*—The number and strength of schools for Europeans rose by one and 153 respectively. The plans of the buildings for the Training College for the domiciled community to be attached to the Lawrence Memorial School, Ootacamund, are under preparation.

10. *Education of Mohamedans.*—During the year, college classes were opened in the Government Madrasa-i-Azam, Madras, and two new Government secondary schools for Mohamedans were opened at Kurnool and Guntur. The number of institutions chiefly intended for Mohamedans increased by 195 and their strength by 8,661. The total number of Mohamedan pupils reading in public secondary schools rose from 7,443 to 7,582.

During the year the Government sanctioned subsidies to local bodies for the opening of 103 additional elementary schools for Mohamedans.

11. *Education of Panchamas.*—There was a further satisfactory advance in the education of Panchamas, the number and strength of institutions chiefly intended for them having risen by 371 and 4,500 respectively. During the year subsidies to local bodies were sanctioned for the opening of 82 additional elementary schools for the benefit of Panchamas. The Government also issued instructions to local bodies in regard to the removal of such obstacles as exist to the admission of the children of Panchamas into schools under public management.

12. *Education of the blind and the deaf mutes.*—The Government are glad to note the good work that is being done in the various schools for the education of the blind and the deaf mutes in the Presidency, especially those at Palamcottah.

13. The Director is requested to include, in future reports, a brief account of the progress of the Boy Scout movement in the Presidency.

LABOUR

Labour Commissioner for Madras.

The following Order (No. 271, Revenue, dated 2nd February, 1920) has been issued by the Madras Government:—

In consequence of a resolution moved by the Hon'ble Mr. Dadabhoy in the Imperial Legislative Council on 16th March, 1916, the Government undertook an exhaustive enquiry into the work that had already been done for the improvement of the depressed and backward classes, including aborigines and the scope of the work that still has to be undertaken. Before the completion of this enquiry the Government, acting on the advice of the Board of Revenue, decided to place Mr. G. F. Paddison, I.C.S., on special duty for a term of two years to deal with the measures necessary for improving the condition of the depressed classes; and orders sanctioning the appointment were issued in G. O. No. 748, dated 29th March, 1919.

2. Owing to the shortage of officers Mr. Paddison's services were required in the Board of Revenue. He was for this reason unable to devote his whole time to his special work until November, 1919, though a certain amount of progress was made.

3. In the meantime, the enquiry which was commenced in 1916 has been completed and a large volume of useful information has been collected.

The general effect of it is clear, namely, that it is not sufficient to confine the duties of the Special

Officer to what are commonly known as the depressed classes, but that it is necessary to include within the scope of his duties all the depressed and backward classes, in other words, labour in general. This is a view that has been expressed in another connection by the Right Hon'ble the Secretary of State for India who wrote in his despatch on the report of the Industrial Commission: "In India, where the workers are unorganized, a special obligation lies upon Government to study their welfare and to secure for them better education, better housing, and a higher standard of living. By her adherence to the International Labour Convention India will now become subject in respect of labour conditions to international criticism. This need not be resented as it is in the best interests of the country that present conditions should be improved." In pursuance of this declaration, the Government propose to develop the duties of the Special Officer for the depressed classes into those of a Commissioner of Labour.

4. Before considering the work which it is now possible to transfer to such an officer, it may be well to state what has so far been taken in hand. The duties assigned to Mr. Paddison in G. O. No. 748, Revenue, dated 29th March 1919, are as follows:—

To study the economic condition of the depressed classes, to submit to Government proposals for improving it, to see that philanthropic bodies working with the same object receive from the Government such help as they may require, and to deal with the problems connected with the education of the depressed classes and with the best means of raising their standard of living by providing them with house-sites and wells, by encouraging co-operation amongst them and by improving their labour conditions.

In pursuance of these ends two deputy collectors have been employed in the districts of Tanjore and Godavari. Arrangements have been made for the acquisition of house-sites in a number of villages and 48 co-operative societies have been established chiefly for the purpose of financing the acquisition proceedings. The work done in the direction of the promotion of education and sanitation has been less obvious, largely for want of funds, but it is hoped that a considerable advance will be made in these directions in the course of the ensuing year.

5. In examining the extension of the Special Officer's duties the first question that arises is whether there should be handed over to him the very large question of the care of the aborigines in the agency tracts whose contact with civilization must increase and who are likely to suffer in the contact unless action is taken to prepare them for it. The Government have anxiously considered this

question, but have come to the conclusion that it involves far too large a duty to be added to the others which they find it necessary to impose upon the Special Officer. Moreover, the question of the agency tracts is still largely an administrative question. The Government are therefore examining this question separately from the administrative point of view, and for the present do not propose to transfer to the Special Officer the conduct of measures for the improvement of the condition of the aboriginal tribes in those areas. In other portions of the Presidency, however, the Government consider that the Special Officer should be entrusted with the conduct of such measures. One special piece of work of this nature is that which is now being conducted amongst the Chenchus in the Nallamalai hills in the Kurnool district where an officer is engaged on measures of education and temperance, and other measures calculated to turn this tribe into regular wage-earners. The conduct of these measures will hereafter be placed under Mr. Paddison's control.

6. Another class that belongs more appropriately to the depressed classes consists of what is commonly known as the criminal tribes. In connection with these tribes special legislation has been put into force and eleven settlements have been formed at which endeavours are made to wean the inmates from their criminal ways and bring them up as self-respecting citizens. The conduct of these measures alone has been considered sufficiently important in some other provinces to justify the appointment of special officers. In Madras they have been conducted hitherto by District Magistrates who have been assisted during the last three or four years by the Deputy Inspector-General of Police, Railways and Criminal Investigation Department. The general result of the work cannot, however, be considered to be altogether successful. Some settlements have had to be closed. Others have been the subject of considerable comment. In particular, the policy in respect of allotment and disbursement of funds has been somewhat ill-defined and the necessity for a more regular system of accounting and auditing has been very marked. Above all, the Government are impressed with the necessity for encouraging in every possible way private effort in connection with the education of these tribes and the removal of them so far as possible from all contact with the Police. On behalf of the Government Mr. Paddison has recently attended a conference of officers interested in similar settlements, which was held at Delhi, and the Government have not decided to transfer to him the general control and management of the criminal settlements. The conduct of other operations under the Criminal Tribes Act, 1911, will remain as heretofore with the Magistracy and Police.

7. Another department which has suffered from lack of proper control is that which is concerned with factory labour. The administration of the Factories Act in this province has hitherto been entrusted to the Board of Revenue, Separate Revenue, the Member in charge of which has had little time to attend to this special work. In the report of the Industrial Commission, it is suggested that the control of this work should be transferred to the Director of Industries. That recommendation was doubtless made in the absence of any officer more directly concerned with labour questions. Where there is such an officer, it seems to this Government unquestionable that it is preferable that he should undertake it. The Director of Industries is concerned with the development of the industries themselves rather than with the care of the labour which deals with them. On the other hand the Factory Inspectors deal largely with questions of the hours of labour, overcrowding, sanitation, and other matters affecting the welfare of the labourers. These are matters which in the opinion of the Government should properly be undertaken by the Commissioner of Labour and the Government therefore resolve to place the Factory Inspectors under his control.

8. Following on these proposals comes the proposal to transfer to the Commissioner's control the question of the taking of the wage census. The Government have found that this work has been unsatisfactorily performed and recently placed Mr. Gray on special duty to enquire into particular questions connected with it. Mr. Gray has submitted his report and the orders of the Government of India for the general improvement of the census have meanwhile been received. The Government resolve to entrust the general conduct of the census, which will be made under the immediate control of District Collectors, to the Commissioner of Labour whose duty it will be to keep himself in touch with wages questions throughout the year.

9. Another question in connection with which the need for a touring officer has been felt is that of the emigration of labour both within and outside the Presidency. This is a point which has been specially pressed by the Board of Revenue, Separate Revenue, in its Proceedings R. Mis. No. 125, dated 20th January 1917, and R. Mis. No. 1960, dated 18th December 1917, in dealing with the general question of the control of emigration. It is desirable that an officer of the Local Government should be fully in touch with all that takes place in connection with the recruitment of labour for emigration whether to places within the Presidency or to places outside and should be aware of the arrangements made in respect of depots, sub-depots and the like through which labour

passes. Mr. Paddison will therefore be now directed to concern himself with all matters affecting emigration of labour except in so far as the Port of Madras is concerned. The Collector of Madras will continue until further orders to be the Protector of Emigrants under the Indian Emigration Act, 1908.

10. Emigrant labour which goes out of the province becomes subject generally to special local legislation and there is a counterpart to this in one area within the province, namely, the Planters Labour Act which is in force in the Nilgiris and the Wynad. Another enactment which sometimes affects labour is the Workman's Breach of Contract Act. It will be one of the special functions of the commissioner of Labour to enquire into the working of these enactments.

11. It will be obvious that an officer controlling various labour interests will be in a better position than any other officer of Government to deal with the general economic aspects of the labour questions which are daily becoming more and more important, including the organization of labour, to advise with regard to the recognition or registration of labour unions, co-operative housing and the co-ordination of unofficial assistance for the health and welfare of labour in general. With the chief of the societies working in this last direction, Mr. Paddison is already unofficially connected.

12. The multifarious nature of the duties devolving on the Commissioner of Labour will demand a comparatively strong staff and a Deputy Commissioner of Labour will be required. This office will be held by Mr. Gray who is already on special duty in this connection. The Commissioner will also take over the staff mentioned in the appendix (not published-Ed., *M. E. J.*) being that which deals with the administration of the factories Act, 1911, and Criminal Settlements. He will also have a staff consisting of several Deputy Collectors with their assistants for the purpose of developing co-operation, housing schemes, and schemes for the education of labourers in various districts of this Presidency. These officers will be called Assistant Commissioners of Labour. In view of the responsible nature of their duties, the Deputy Commissioner and the Assistant Commissioners will each receive a deputation allowance of one-fifth of their salary. The Government of India will be moved to sanction the grant of a similar allowance to the Commissioner.

13. Finally the Government propose to associate with the Commissioner an Advisory Board of persons informed on and interested in labour questions. Mr. Paddison will be requested to nominate immediately suitable persons for appointment to the Board.

MYSORE ECONOMIC CONFERENCE.

AGRICULTURAL COMMITTEE.

The following is a brief review of work done by the Agricultural Committee during the period ending 31st December, 1919.

INTRODUCTORY.

The subjects on the Committee's Programme for the year 1919—20, were grouped under twelve heads and a Sub-Committee was constituted to deal with each group. Four meetings of the Committee were held during the half year ending 31st December 1919.

The following are the subjects on which definite action has been taken by the Committee, while the rest of the subjects on the Programme are engaging the attention of the Committee.

INCREASE OF FOOD PRODUCTION.

- (i) *Formation of Colonies for Landless Agriculturists.*—This subject was thoroughly discussed by the Committee in all its details, and as a result, recommendation has been made to Government to arrange for blocks being reserved for grant, either free or at upset price, to landless agriculturists who cannot afford to purchase the lands in public auction, and to appoint a Gazetted Officer specially for the work of forming agricultural colonies of the State's landless classes, preference being given, wherever possible, to depressed classes.

- (ii) *Agricultural Workshop.*—As an incentive for the adoption by the ryot of improved agricultural implements on a larger scale than at present, a recommendation has also been submitted to Government to arrange to take steps for the formation of a separate agricultural workshop under the direction and control of a qualified expert for the design, manufacture and supply on a large scale of agricultural implements suited to local conditions.

ORGANIZATION.

Agricultural Museum.—A reference has been submitted to Government to put up permanent buildings for locating not only the Agricultural Inspector's office but also the Implement Depot and an Agricultural Museum.

RURAL DEVELOPMENT.

Land Mortgage Bank.—Proposals with a draft scheme for the establishment of a Land Mortgage Bank—both for the malnad and the maidan—on a co-operative basis, have been submitted to Government for sanction. This is perhaps the most important piece of work turned out during the half year under review.

COMMERCIAL CROPS.

Sugar Factory.—A reference has been submitted to Government for the reconstitution of a Special Committee for the establishment, of a Sugar factory under the Krishnarajasagara.

Tea.—A Special Committee has been constituted to go through the rules relating to the grant of land for the cultivation of tea as the Committee thought that the appointment of an expert for making a preliminary survey of lands fit for tea cultivation would not serve any useful purpose.

Pepper.—Certain information regarding this industry has been called for from the Director of Agriculture and the Deputy Commissioners of the Malnad Districts.

LIVE-STOCK.

Sheep Farm.—Orders of Government have been received for the transfer of the Sheep Farm to the control of the Agricultural Department for being eventually placed under the charge of the Superintendent of Animal Husbandry. The farm contains 129 animals as detailed hereunder:—

Merino Hybrid rams	...	...	22
do Ewes	...	...	27
Dumba hybrid rams	...	...	7
do Ewes	...	...	6
Country ewes	...	...	67

Total .. 129

The experiments in connection with the cross breeding of the country ewes with the Australia Merino and the Quetta Dumba rams having proved fairly successful, and the Government having, as a result of the Committee's recommendation, sanctioned the appointment of an Expert in Animal Husbandry, the Committee suggested the handing over of the farm to the Department of Agriculture for conducting further experiments. Orders of Government have since been received, sanctioning the proposal of the Committee.

Cattle Owner's Associations:—Reference has been made to Government to grant subventions to such associations, equal to the collections made by them just as in the case of Agricultural Associations

Breeding Bulls :—Recommendation has been made to Government that in addition to the existing maintenance grant, half the price of the animal may be borne by Government in case of individuals, Associations or Village Improvement Committees purchasing bulls for public use, whether Amrit Mahal or otherwise.

FRUIT CULTURE AND SUBSIDIARY OCCUPATIONS.

Temporary Depots for fruit plants in Districts: Orders of Government have been sought for meeting transport charges of fruit plants to be supplied to District depots which may be opened by private nurserymen in places where there are no fruit plant nurseries either public or private.

Experimental Fruit Garden in Chikmagalur.—The selection of a site for the location of an experimental fruit garden at Chikmagalur or some other suitable place in the Kadur District, is being investigated.

SERICULTURE.

Mulberry Plantations.—Government have been requested to arrange to start one or more experimental plantations of tree mulberry in suitable localities and to set apart a sum of Rs. 5,000 for this purpose.

Bee Keeping.—At the instance of the Committee, Government have passed orders placing a sum of Rs. 200 at the disposal of the Agricultural Department for pursuing the experiments in this industry on the lines studied by Mr. Kunhi Kannan at Trichinopoly.

AGRICULTURAL EDUCATION

Horticultural and Mali Schools.—The examination of the candidates under Horticultural training was held in November 1919, with the result that 11 came out successful. Government orders have been received sanctioning the proposals of the Committee to discontinue the Horticultural School at the termination of its course and to continue the Mali Class for another year. The possibilities of combining the horticultural courses with those of agriculture are being investigated by a Special Sub-Committee, appointed for this purpose. Pending their report, the Horticultural Classes have been proposed by the Committee to be discontinued.

COLLECTING AND SPREADING OF INFORMATION.

The following leaflets in Kannada have been issued during the period :—

- (1) Lucerne Aphids
- (2) Co-operative plan for selling milk.
- (3) Sheep Breeding.

Steps are being taken to collect and publish proverbs relating to Agriculture in State. The Agricultural Department have been requested to arrange for the publication of a bulletin containing full information about all the important and various kinds of paddy and ragi grown in Mysore, and for a book of Agricultural facts and figures.

S. N. APPANNA IYENGAR,
Secretary.

DISTRICT PROGRESS REPORT.

Shimoga.

AGRICULTURE.

Tractor and Motor Plough.—The Committee resolved to request the Director of Agriculture kindly to arrange for a demonstration of the motor plough and intimate the date of such demonstration to enable the ryots of the district to go and witness it.

Garlic Cultivation.—The Committee decided to request the Agricultural Associations to popularise the cultivation of garlic by getting good seeds through the Agricultural Department, and to try it at the first instance in the Channagiri taluk.

The Horticultural Sub-Inspector.—It was resolved to depute the Horticultural Sub-Inspector to work under the Assistant Director of Agriculture of Shimoga.

EDUCATION.

The Itinerant Lecture.—The members were not in favour of continuing the itinerant lecture.

INDUSTRIES AND COMMERCE.

The Peripatetic Blacksmith.—The Committee resolved to depute the blacksmith to work under the District Superintendent of Industries.

BOOKS IN BRIEF.

Large and Small Holdings.—By H. Levy, Ph.D., Professor in the University of Heidelberg. Translated by Ruth Kenyar, with considerable additions by the Author. Cambridge University Press.

This is a comprehensive work treating not merely as its title indicates of the economies of Large and Small Holdings in England but also of the development of Agriculture in that country since the Agricultural Revolution of the Eighteenth century. Dr. Levy rightly insists that English systems of land management cannot be understood unless its history of agriculture is studied. Its history of agriculture is the history of the evolution of the Large Farm. Though the large farm has ceased to extend its boundaries, it is still predominant in English farming. Dr. Levy's object is to explain this preponderance. He finds the key to the position in the agricultural history of the Eighteenth century. His sketch of this history is both brilliant and striking and shows how the independent agricultural population was brought in social slavery by the force, not of the Cannon, but of the plough. His treatment of the period of the Corn Laws and the circumstances which led to their abolition and the consequent development of Foreign competition is equally thorough. The end of this period brings them to the question of small farms, with whose economic aspects he deals in a subsequent chapter. In another chapter—a most suggestive one—he touches on its social and political aspects. What was the small holding intended for? It was, Dr. Levy points out, to check the rural exodus which has become the curse of the country. The course of Legislative action which followed is sketched out by Dr. Levy in an interesting chapter, which merits careful study. He thinks that non-economic forces are still (he wrote before the war) making against the system of small farms. The war has probably given a check to these, and it is not improbable that this check will prove an effectual and permanent one. The respective economic advantages of large and small holdings are dealt with by Dr. Levy at great length in a chapter which should not be missed. It is really the Kernel of the book and those interested in the question of holdings generally—in India or elsewhere—would do well to study it with care and attention. The penultimate chapter on agricultural co-operation deserves mention, for it also brings out what the main function of co-operation in agriculture should be. We should be glad to see this book

is studied by all who desire to understand the progress of agriculture in England, and the essential conditions on which that progress depends. Such a knowledge of British agriculture is of importance to this country, where important questions regarding holdings are now coming to the front.

A Manual of Co-operative Societies in the Bombay Presidency.—By R. B. Ewbank, I.C.S., Registrar of Co-operative Societies. Government Central Press, Bombay. Price Rs. 2-10-0.

We congratulate Mr. Ewbank on the issue of a new and revised edition of his well-known *Manual*. It is not merely a handy book of reference but also makes available to the interested public the accumulated experience of the Department in a simple and readable form. The work of revision has been so thorough that practically the whole book has been re-written and many new chapters have been added. We need only mention the various parts of the book to show how comprehensive it is in its treatment of co-operation generally:—Part I. Introductory under which is included besides, an excellent account of co-operation in India, the text of the Co-operative Societies' Act (II of 1912) and the Rules issued under it by the Bombay Government. Part II deals with Credit Societies and Banks; Part III with other types of societies; and Part IV is headed general and gives details relating to the management of societies, arbitration, liquidation, privileges of registered societies, inspection and audit, etc. The Appendices include the Resolution of the Government of India issued with Act X of 1904, the letter of the Government of India issued with Act II of 1912, select bibliography of Indian publication on co-operation, etc. We heartily commend it to all taking interest in the co-operative movement. We should like to see it added without delay to the libraries of all the leading Co-operative Societies and banks in the country.

The Village Labourer. 1760-1832.—By J. L. Hammond and Barbara Hammond. Published by Messrs. Longman's Green & Co., Bombay and London.

This is a new and revised edition of a noteworthy book that created much heated discussion in England when it first appeared in 1911. The authors answer their critics in a spirited yet scholarly manner. It is always impossible for the governing classes of any country, or day, to feel convinced of the criticism advanced against them. The authors described their work as "a study in the Government of England before the Reform Bill" and their critics forgot this sub-title when they blamed for not doing things which they never undertook today. They, therefore, point out in this edition

that the subject of the book is the condition of the village labourer, and the way in which the ruling class treated the several problems that were presented by the difficulties of the labourer's position. More than half the book is in fact taken up with other causes of the labourer's degradation than the enclosures themselves. The book is "a study in Government, a discussion of the lines on which Parliament regulated the lines and fortunes of a class that had no voice in its own destinies." With this may be compared the sentences with which the authors close the concluding chapter of their book. They say.—"Amid the great distress that followed Waterloo and peace, it was a common place of statesmanlike castlereagh and causing that England was the only country in the world, and that so long as the monopoly of their little class was left untouched her happiness would survive. That class has left bright and ample records of its life in literature, in art, in political traditions, in the display of great duties and debates, in memories of brilliant conversation and sparkling wit; it has left dim and meagre records of the disinherited peasants that are the shadow of its wealth; of the exiled labourers that are the shadow of its pleasures; of the villages sinking in poverty and crime and shame that are the shadow of its power and pride."

The Mineral Resources of the Empire.—The Mineral Resources Committee of the Imperial Institute of which Viscount Harcourt has succeeded the late Viscount Rhondda as Chairman, has arranged for the issue of a series of Monographs on the Mineral Resources of the Empire of which one on Zinc Ores has already appeared. Others on Manganese Ores and Tin Ores are now published by Mr. John Murray. The Monograph on Manganese Ores has been prepared under the direction of the Committee by A. H. Curtis, B.A., F.G.S., and that on Tin Ores by G. M. Davies, M.Sc. (Lond.), F.G.S., of the Staff of the Imperial Institute. In each case the book is arranged in three chapters. The first gives a brief survey of the occurrences of the ores and of the characters and uses of the metals. The second chapter deals fully with the sources of supply within the empire and the third describes shortly the deposits in foreign countries. The monographs conclude with a bibliography of the principal publications on the subjects dealt with. The monographs are published at 3s. 6d. net. Owing to its extensive employment in the manufacture of iron and steel, manganese was in great demand during the war. Unfortunately there was a serious shortage of manganese ores, as supplies from the Caucasus, the chief producer, were cut off, and shipping difficulties restricted the amount available from India, which ranked second only to Russia as a producer of man-

ganese ores. At the present time the output from India is increasing and Brazil has enormously enlarged its production, but in view of the disturbed conditions still prevailing in Russia, there is likely to be a continued shortage of the ore there for some time to come, particularly of the higher grades now required by metallurgists and in chemical industries. Several additional sources are indicated as possible contributors to the World's supply in the future. The Mysore deposits are referred to briefly in the monograph (pp. 35, 41, etc.) The Empire is favourably situated as regards supplies of tin ore and at the present time between 50 and 60 per cent of the world's output is obtained from British countries. Moreover, it holds a controlling influence in the industry of tin smelting and refining. The Federated Malay States is the most important tin-producing area in the world and most of its output, together with ore from Siam, the Dutch East Indies, South Africa and other countries, is smelted in the Straits Settlements. Bolivia and the Dutch East Indies are the chief foreign producers of tin ore. Owing to the war the German tin-smelting industry has practically ceased, and another result of the war has been the establishment of a tin-smelting industry in the United States which country consumes 40 per cent or more of the world's output of tin. Among British sources of supply of tin in the future Nigeria is specially referred to. Both the monographs are typical of the series to which they belong and indicate the lines generally on which monographs of this kind should be done.

ACKNOWLEDGMENTS.

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LEAVES FROM A DIARY.

BY "M."

EDUCATION IN JAPAN OLD AND NEW.

[These are pages from the Diary of an
Indian officer in Japan.—Ed. M.E.J.]

EDUCATION on the Western model was introduced into Japan when the Imperial Government was re-established under the present Mikado just thirty years ago. In former times, instruction was given by priests attached to the temples as was done in India. Buddhist *sutras* and other religious texts were taught along with Chinese literature. For some time Confucian classics and Japanese history were given prominence. Elementary education was confined to instruction in reading Chinese characters, writing and arithmetic. No special schools existed except a few for the study of medicine and mathematics. It was heresy to imbibe foreign ideas and people were occasionally punished with death who travelled abroad or who were suspected of believing in Christianity or of studying the customs, languages, or manner of infidel foreigners.

All this is changed now. Many of the men who opposed and scoffed at the changes thirty years ago are now ardent supporters of the modern system of education after personal experience of the old and the new order of things in a single life-time. Early in

their career of reform, the Japanese leaders found out the secret that education was the basis of all progress. The object which the Japanese Educational Department has steadily kept in view is the training of the native mind to European ways of thinking. One of the very first acts in this direction was the issue of a Code of Education the object of which was thus explained to the nation by the express Command of the Mikado:—"All knowledge from that necessary for daily life to that higher knowledge necessary to prepare officers, farmers, merchants, artisans, physicians, etc., for their respective vocations is acquired by learning. It is intended that henceforth education shall be so diffused that there may not be a village with an ignorant family, nor a family with an ignorant member."

Government set about reforming education by studying what was being done in that direction in foreign countries. Foreign teachers were engaged from America and Europe. Japanese educationists were sent to foreign lands to investigate educational matters on the spot. Several foreign language schools were started and the necessary preparations for the higher branches of science and art were provided to qualify people for commerce and other practical pursuits. In 1877, the Tokio Imperial University was established by incorporating two old existing Colleges. The Code of Education was frequently revised and in one of the revisions, the principles kept in view

were explained to be "the cultivation of the moral character, the development of the spirit of loyalty and patriotism and the acquisition of knowledge necessary for practical occupations." Military drill was encouraged in the various schools with a view to develop discipline and other healthy traits of character. His Majesty the Mikado made a speech in which, "the young were admonished to attend to their studies and practise their respective callings, to cultivate their intellectual faculties and train their moral feelings, to foster the public weal and promote the interests of society, the conclusion being expression of a hope that neither His Majesty himself nor any of his subjects should at any time fail to observe these principles faithfully." This speech was widely distributed and it was enjoined on all those engaged in the work of education never to neglect the duty of improving themselves and rightly teaching their pupils.

GENERAL SKETCH.

The educational activity of Japan is many sided. There is a separate Minister of State aided by a Vice-Minister to control all affairs connected with education and learning. There is a complete system of primary and public school education, there is a growing system of industrial and commercial education side by side with middle and high schools. There is the University and institutions for the highest practical and scientific education. There are besides the Higher Commercial and Technical schools, the Higher and Ordinary Normal schools, Higher Female schools, Fine arts, and Music schools, Blind and Dumb schools, Kindergarten, etc. In 1895 there were over a thousand termed miscellaneous schools mostly unorganized and under private control. These schools which are not classified had for their object instruction in Japanese and Chinese literature, in the English language, in French, German or Russian, in Law, Medicine, Philosophy Navigation, book keeping, commerce, statistics, industry, etc. Private individuals main-

tain schools for teaching English and other Foreign languages. Some of these in Tokio are attended by over 1,000 pupils.

The following is a list of institutions and the pupils attending them which will give an idea of the extent and variety of educational institutions in the Country:—

	No.	No. of students.
Elementary schools	26,631	Male 2,435,223 Female 1,235,122
		Total 3,670,345
Apprentices' schools	10	1,117
Technical schools	97	14,806
Supplementary schools		
for technical education	55	3,327
High schools	6	4,109
Middle schools	96	30,871
Normal schools	49	7,734
Kindergarten	219	17,428
High Female schools	15	2,897
Universities	2	1,620
Special Schools	1,263	64,948

Out of the large number of elementary school, 3,976 schools have been Sewing, Handiwork, Agriculture and Commerce added to the regular and supplementary courses.

There are libraries where books are kept for the use of the public and assist the literary tastes of the public. There is an institution established by Government under the title of the Tokio Academy with a view of exercising a beneficial influence on education in general and composed of members selected from among old and experienced men of learning who meet and deliver addresses on education topics.

Besides the above which are controlled by the Minister for Education, there are the Nobles and Peeress's school under the control of the Department of the Imperial Household, there is a Military College, a Military Academy, Cadet and other Military schools and Corps of instruction under the War Department. There is a Naval College, a Naval Academy, Naval Medical College and other schools under the Naval Department. There is a Navigation school.

There is a keen demand for knowledge and information everywhere especially bearing on economic and material progress of the country and the Government and the leaders cheerfully make all sacrifices to meet that demand with alacrity.

REMARKS ON STATISTICAL COMPARISON.

The special feature of Japanese education compared to the Indian systems may now be briefly summarised.

Elementary education is compulsory up to the 14th year.

Special importance is attached to practical training as will be seen from the large number of elementary schools where hand-work agriculture and commerce are taught.

Compared to the population the number of technical and commercial schools is very large and the tendency is to increase them still more largely. Great importance is attached to higher Commercial and Technical education. In the Higher Commercial School at Tokio, instruction is given in English, German, French, Spanish, Chinese and Russian, with a view to train Japanese to enter into business trade relations with all countries with which the civilised countries have commerce.

In the Universities also, the highest practical instruction is given in Practical Chemistry, Engineering, Mining and other subjects with a view to train men to take a leading part in the industries and manufactures.

All school-going children are required to wear school uniforms which have a Military cut and all male children undergo Military drill. One remarkable feature is the perfect discipline they undergo without making it irksome. The children are kept most cheerful. All children are instructed in morals, loyalty, patriotism, behaviour and human relations. They are occasionally taken into the country by rail.

Female education of an elementary description has made great progress. There are

about 1,500,000 girls at school in Japan while in India the number is only 400,000. Higher female education is also being rapidly developed in Japan but it is admitted there is as yet no intellectual equality between the sexes. There are no girl graduates in that country because probably students are kept in the Universities till they are 26 or 27, an age at which if women are mothers in Japan, they are grand mothers in (my country) India.

FACILITIES TO STUDENTS.

The Japanese student is poor and the schools give every facility to help him on. The food expenses of a student come to Rs. 7 to 9 in Indian money. To keep a lad at a common school, it costs the parent at present 9 to 15 rupees; at the ordinary middle school Rs. 14 to 20, and at the Imperial University, Tokio, Rs. 16 to 22. This includes board and lodging, books and petty expenses but excluding clothes. These figures represent very nearly the cost of education in India except in the matter of University education which is comparatively more costly in India.

In the Universities of Tokio and Kioto, I was assured by the professors that students are not required to buy books. Most cannot afford the expense. The professors give notes and the students pick up information from Library books. The University assists students to visit offices and business places and industries to acquire practical experiences. One very great encouragement which the Japanese student gets is the opportunity of employment. The training he receives is practical and of a high order and so great is the demand for University men that appointment Government or private await them as soon as they pass out. In many cases, their services are bespoken before they complete their course. The country wants these men in its new national life and they cannot be got through the University fast enough to meet the demand.

GENERAL OBSERVATIONS.

Both at Tokio and Kioto, I had the privilege of meeting several professors both European and Japanese and had long conversations with several of them. Living amidst Japanese surroundings, I was thrown in the company of several well-behaved students at Tokio. The professors lead simple lives and work from patriotic motives although men of their qualifications can earn much more in private employment than they can hope for under Government. With them it is a case of high thinking and plain living. Their thoughts are European, their dress out of door is European, in home life and everything else except work, they are Japanese. They keep no furniture—they cannot afford the expenditure—in the European fashion but their homes are nevertheless very clean and attractive, may be from a Japanese or Indian point of view. The salaries of professors everything included in the Tokio Imperial University ranges from Rs. 150 to 250 a month. The directors of Higher schools are paid Rs. 200 to 300. Other teachers are paid in the same proportion. The teachers in the common schools are very poorly paid. Out of a total of 47,000 teachers in the ordinary elementary schools, no less than 20,000 draw a monthly salary of less than Rs. 15 and 5,000 of these less than Rs. 8 per month. His Excellency the Minister for Education, the highest educational authority in the land supports his exalted position on Rs. 750 per month.

I met several men in Tokio who held a multiplicity of employments. These work in offices as Secretaries or heads of departments and they teach also several hours in the University. I met one talented professor who held an important Government office, a professorial chair and who was also the principal editor of an important journal. Asked why he wore away his life working like that, he remarked he could not make money enough. Professors in Government

schools are allowed to teach in or preside over private schools. The private school or college is a great feature in the educational progress of the country and the private school-master works with singular devotion for moulding young Japan. One of the best-known private colleges is the Keio Gijiku. "Its Director, Mr. Fukuzawa," remarks Professor Chamberlain, "is a power in the land. Writing with admirable clearness, publishing a popular newspaper, not keeping too far ahead of the times, in 'favour of Christianity yesterday because its adoption might gain for Japan the goodwill of Western nations, all eagerness for Buddhism today because Buddhist doctrines can be better reconciled with those of evolution and development, pro and anti foreign by turns, inquisitive, clever, not over-ballasted with judicial calmness, this eminent private school-master, who might be Minister of education but who has consistently refused all office is the intellectual father of half the men who now direct the affairs of the country.'"

A press communique states that at a meeting of the zemindars and landholders of the Madras Presidency held on 8th January to discuss the question of the future of the Rajkumar College it was resolved that the consideration of the establishment of the Rajakumar College be postponed till a sufficient number of boys and funds are forthcoming and that at present the boys at Newington be sent to public educational institution in or near Madras approved by the board of management and that they be accommodated in a separate hostel.

SUGAR-CANE CULTIVATION IN MYSORE.*

BY LESLIE C. COLEMAN, M.A., Ph.D.,

Director of Agriculture in Mysore, and

BY B. NARASIMHA IYENGAR, B.A.,

Agricultural Chemist.

THE great bulk of sugar-cane of the State is raised under tanks, channels from rivers supplying only an insignificant part of the whole and wells supplying a still smaller area. It is, we think, safe to say that not more than 70 per cent of the sugar-cane grown in the State is supplied from river channels. The reason for this lies chiefly in the fact that channel supplies are almost invariably cut off in the hot weather so that if the lands are not commanded by subsidiary tanks which may, in some cases, be filled from the channels during the monsoon season, it is impossible to grow cane. The restriction of the growth of cane to areas under tank helps to explain why our area is not increasing. Of the 20,000 odd tanks in the State, only a comparatively small number have an assured perennial supply.

The average size of holding in Mysore is approximately seven acres. Consequently the area of sugar-cane cultivated by any one agriculturist is usually very small. Only a very small number of landholders grow a sufficiently large area to allow them to install with profit a power-driven sugar-cane crushing plant. On the other hand there is a fairly large number of villages in which the area under sugar-cane exceeds fifty acres, so that there is considerable scope for the introduction of small power plants on a co-operative basis. Efforts in this direction in the past few years have, however, met with almost universal failure.

While sugar-cane can be and is grown upon almost any type of soil with an ade-

quate water-supply, still it is customary to use the best soil available. It is in the great majority of cases land upon which paddy is also grown and is, therefore, a dark clayey or silty loam. The main rotation is a sugar-cane "paddy" one. Sugar-cane is usually grown in comparatively small patches surrounded by extensive paddy fields. The result is that drainage is commonly very defective. The sugar-cane paddy rotation is undoubtedly a poor one from the standpoint of sugar-cane cultivation but paddy is such an important food crop that there is no likelihood of there being any marked change in this regard. Minor rotations need not be mentioned here as they will, no doubt, be brought out by other witnesses.

On approximately three-fourths of the sugar-cane area in Mysore no commercial manure is used. Cattle-manure, sheep manure (by folding), tank, silt, night soil and, in a very small extent, green leaf brought in form the sources of manure supply. Green manures are practically never used for sugar-cane. On the remaining fourth, oil-cakes are used to a greater or less extent, the chief oil-cakes used at present being honge, castor and ground-nut. The use of cakes as a manure for sugar-cane is undoubtedly profitable where there are no other serious limiting factors.

The most serious insect pests of sugar-cane in Mysore are the various moth borers one of which seems to be the most important. Probably the greatest objection to Red Mauritius cane is its greater susceptibility to borer attacks as compared with the old standing varieties. The entomological section has had these insects under study for some time.

Sugar-cane is chiefly irrigated from tanks. Canals and well irrigation are of minor importance in this State. The only possibilities of large increases of areas for sugar-cane is in the development of one or two sparsely settled irrigated tracts such as the Marikanave

*Note prepared for the Indian Sugar Committee.

area in Hiriyr Taluk, Chitaldrug District, which the Sugar Committee will visit and the area under the Sulekere Tank in Shimoga District. The former commands rather more than twenty thousand acres which can be increased by another 7,000 acres should the high level canal, which is now only about five miles long, be extended. The latter commands about 4,080 acres. The cultivation of sugar-cane in these two areas is at present very small, largely we believe, because of the very sparse population. If the second stage of the Krishnaraja Sagara dam is constructed 120,000 acres will come under irrigation. This would allow for a sugar-cane area of at least 20,000 acres. Pump irrigation from our rivers, notably in the Western part of the State, could lead to a very great increase of sugar-cane cultivation in the State. Unfortunately, most of the pumping schemes developed in the past seem to have been a failure. The Chief Electrical Engineer will be able to describe to the Committee experiments on electrically-driven pumps which seem to promise well wherever the land does not lie too far from power lines.

Attempts have been made to construct a simple form of multiple furnace with a view to utilize the heat of the waste gases and save fuel. So far as the present results go, the new system of multiple furnace has not shown any reduction in the fuel used, though there are other advantages in its favour. The multiple furnace system makes skimming easier and renders it possible to filter the syrup without much difficulty thereby improving the colour of the jaggery produced.

Ever since its establishment, the Department has been devoting much attention to the manufacture of sugar direct from the juice. It is clear from the statistics that the imports of sugar into India are increasing by leaps and bounds. In a country which produces a cane like the "pattapatti" where the methods of extraction are far from being perfect, there is ample scope to increase the

recovery of the sugar contained in the crop grown. How far it is possible to manufacture sugar on a commercial scale with the existing mills and open pan boiling, has been studied here in very great detail. It has been established beyond doubt that it is quite possible to produce white sugar fit for direct consumption from the juice direct, without any special process of bleaching the juice.

The investigations, up to the present have all shown clearly that with the crude methods of milling the cane and evaporating the juice, even though it is quite possible to produce white sugar fit for direct consumption, the percentage recovery of sucrose as marketable product is not large and the losses are great. With improved machinery and modern appliances, these losses will, no doubt, be minimised. Even for jaggery making on a large scale the open pan system of boiling is not efficient. Their being not much control over the heat, it is very difficult to prevent charring and produce jaggery of a uniform light colour. For a cane planter with 30 or 40 acres under cane each year, a stream evaporating plant might come in very handy even, for jaggery-making. Much experimental work still needs to be done on the manufacturing side of the industry.

The question of Central Factories in Mysore is one that could be taken up on only one or two isolated areas. If the second stage of the Krishnaraja Sagara dam is completed there may be a chance for a sugar-cane factory in some place in the tract which will come under irrigation. There are as far as we are aware only two irrigated tracts at present existing where there is any chance for a sugar factory. These are the Marikanave tract and the Sulekere tract. In both of these, sugar-cane is at present an insignificant crop so that should a sugar factory be established in either of these places it would in no way affect the manufacture of jaggery. The only place at present existing where a central factory, crushing 500 tons a day, could be established would be in the Marikanave area. If the high level channel is completed and an area of fairly good soil allowing for the planting of about

2,000 acres of cane per annum might be obtained. Red Mauritius cane in this tract if properly cultivated and manured might average about thirty tons of cane per acre.

A Central Factory in our opinion would have a fair chance of success in Mysore only if the land were entirely under the control of the factory. Past experience goes to show that Mysore ryots are not prepared to enter into any agreement with regard to growth of cane or price at which cane is to be sold.

In Mysore we are able to produce and are producing cane of very good quality. Our chief sources of loss are through imperfect extraction and failure to mill at the proper time owing to lack of labour. Our chief development in the near future must be along the lines of improving our indigenous methods by the installation of small power plants. Nevertheless, we believe, that the jaggery market is not expanding and that the time is coming when the continuance of sugar-cane cultivation will depend upon the development of sugar factories. We, therefore, favour the establishment of a central sugar factory in the State if it is at all feasible. Such a factory should, in the first instance, have a supply of cane under its own control sufficient to ensure its profitable working. The land should, in our opinion, be purchased, not leased. If such a factory were established and proved a success we have little doubt that cultivators in the neighbourhood could be induced to sell their cane to the factory at a rate which would ensure them a good return for their labour and would at the same time, enable the factory to work it up at a profit.

We don't believe that Government assistance would be required except as regards communication facilities and in connection with the acquisition of land. In the two areas already mentioned by us the land is practically all under occupation. This means that land could be acquired at a fair rate only through the assistance of Government.

No sugar-cane forecast is at present published in this State. The collection and publication of all agricultural statistics is at present in the hands of the Revenue Department. We believe that a special statistical section in the Agricultural Department should be created to deal with the crop forecasts and the preparation of all agricultural statistics.

AGRICULTURE IN MADRAS, 1918-19.

By "RUSTICUS."

IT will be long before the effect of the war ceases to be felt by the Agricultural Departments throughout India. Many promising lines of development have been held up completely during the last five years for lack of staff and funds. In Madras, for example, there were only four Deputy Directors of Agriculture last year for the seven Circles of the Presidency. It is pleasant to see in the report by Mr. Wood, the Acting Director of Agriculture, on the work of his Department for the year some signs of a recovery which will undoubtedly be rapid. Two new Deputy Directors joined duty at the close of the year. Two swallows do not make a summer but it is so long since any new recruits could be obtained that these additions to the staff were very welcome. Fortunately the subordinate Indian staff rose to its increased responsibilities during the period of shortage in a way which very considerably lessened the difficulties of a Director.

Following our usual practice in reviewing the reports of the Provincial Agricultural Departments, we shall first deal with individual crops. Paddy is probably the most important crop grown in the Presidency and Mr. Wood mentions that the average annual value of the outturn is over 60 crores of rupees. It is hardly surprising, therefore, that the Economic Botanist, Mr. Parnell, practically confined his attention to work on paddy. The results he obtained amply justified him in doing so for his selection work made great progress. Of his selected strains, No. 24 had given the best results previously but a strain from this, No. 1303, has been found to be 16 per cent better than its parent. Two strains of the variety known as Red Samba, selected and grown in the Tanjore

delta at Manganallur, were found, after two years' trial, to be 17.5 per cent and 15.5 per cent better than the farm strain which Mr. Wood holds was probably superior and certainly not inferior to the ordinary run of the seed used in the delta. Mr. Parnell's improved strains do not appear to be available for distribution as yet and the farm strains are the result of more primitive methods of selection. Even so, the Department is supplying a very large quantity of seed from them at prices well above the market rate which shows that these strains are much appreciated. The campaign for the more economic planting of paddy has now progressed so far that no attempt is made to estimate the area which is planted on economic principles. It is obvious that the extra yield resulting from the introduction of improved strains of paddy or, for that matter, of other crops, means an extra drain on the soil. The Agricultural Department is fully alive to this and is doing its best to make provision for it. It has opened several depots for storing fish guano and fish manure on the West Coast at which, during 1918-19, over 700 tons of guano and 22 tons of beach dried sardines were purchased and stored for subsequent despatch all over South India. An interesting feature of the year's work was the special campaign for the increase of food production by the use of suitable manures which was carried on in the Tanjore delta by the district staff with the help of students from the Agricultural College. A special mixture was made up which included fish guano, mineral phosphate, castor cake and bone meal in proportions suggested by the results of the experiments at Manganallur which had thrown considerable light on the manurial requirements of the tract. It was distributed to about 500 individuals in over 300 villages of the delta under agreement that the manure was to be applied in accordance with the instructions of the Department which was to be allowed to harvest and record the yields both of the

manured plot and of similar adjacent unmanured land. The owner undertook, if he was satisfied with the result, to purchase sufficient manure for ten acres in the following season. Unfortunately, owing to those adverse conditions which are the bane of the agriculturist's life and in the face of which he is absolutely helpless, the energy expended was almost in vain. The Cauvery for almost the first time in recorded history failed almost completely. A crop was obtained in a few places only but there the success of the manure was sufficiently encouraging to warrant the stocking of some 500 tons of the special manure for sale during the current season.

Nowhere in India has better work been done on cotton than in Madras and Mr. Wood quotes with evident satisfaction the encomiums passed on it by the Indian Cotton Committee. The Department has already made considerable progress in carrying out the recommendations of that Committee. Work in the Ceded Districts where the "Northerns" and "Westerns" varieties of cotton are grown is now being concentrated on the two strains Hagari 25 for the "Westerns" tract and Nandyal 14 for the "Northerns." The latter strain was regarded by the Cotton Committee as one of the finest indigenous cottons they met during their tour. In the extreme south of the Presidency, the work of spreading the "Company" cottons evolved by the Department continued but there so much has been done already that the law of diminishing returns is coming into play and progress was consequently not so rapid as in previous years. Nevertheless, 1,85,000 pounds of seed were obtained from the Koilpatti farm and from the areas leased as seed farms, nearly all of which was sold at a premium of about Rs. 2 per potli of 250 pounds. The "Company" cottons have now spread so widely that it is impossible to trace what happens to the seed. This means that it will not be long before a premium

ceases to be paid for it even when it is bought from the seed farms as the cultivator will be able to get it more cheaply elsewhere. The seed unions which now grow pure seed for the Department are thus face to face with the serious problem of making a sufficient profit to recompense themselves for the trouble they are put to in keeping to the Departmental regulations. They have hitherto been able to do this out of the extra price they were always able to obtain for their seed but this will no longer be possible. The Tuticorin Chamber of Commerce has come to the rescue and has agreed to impose a voluntary cess of four annas a bale to raise a fund which will be devoted to the benefit of the cotton industry of the south in various ways. Most of it will be utilized in guaranteeing a premium to seed unions.

The Cotton Committee considered that one of the most urgent problems in the Madras Presidency was work on Cambodia cotton. A site for an agricultural station which will be devoted to work on this variety has been acquired in the Coimbatore district. During the year, the Department paid special attention to the purchase and distribution of good Cambodia seed and 300,000 pounds were bought most of which was used in the southern districts. A start was also made in multiplying the departmental stock of Cambodia seed and some 3,000 pounds of seed from the Central Farm were sown in the Coimbatore district by selected growers. The most interesting development of cotton work in the Presidency during the year was, however, the formation of the Cambodia Cotton Marketing Association in Coimbatore, the objects of which are the establishment of the use of definite cotton standards for trading in Cambodia on the lines of those used in other markets and the establishment of an open cotton market at Tiruppur, the centre of the Cambodia tract. The Cotton Committee saw in the open market one of the most potent remedies for the adulteration, mixing and damping which have proved

so harmful to the reputation of Indian cotton and have prevented the cultivator, who is only in a minor degree responsible for them, from obtaining the proper price for his product. There can be no doubt that the step which has been taken in Coimbatore, largely owing to the energy and initiative of Mr. Holmes, the local agent of the bank of Madras, will have the most beneficial effects. We trust that it will not be long before similar markets are established in the northern cotton growing districts of the Presidency where they are even more badly needed and also that, as the Department gets more staff, it will be able to devote some attention to the hitherto much neglected Coconada tract. Before leaving the work on cotton, mention must be made of the introduction of the Pest Act which means the eradication of two and three year old cotton and the consequent destruction of the insect pests which inhabit it.

The important work at the sugar-cane breeding station at Coimbatore is intended more for the benefit of the north of India than for the Madras Presidency. The Coimbatore seedlings are now being grown at various stations in the North and though they have been found to display wide variations are, on the whole, most promising. A number of different varieties of cane were tried on the different agricultural stations in the Presidency. Beyond this, little work was done on this crop except for the introduction of improved furnaces which make it possible to do without any fuel except the megasse and trash from the cane. The experiments with two cane crushing plants were not a great success as the use of the plant did not prove likely to turn out a commercial proposition unless some means were discovered of utilizing the engine during the off season.

As for other crops, Mr. Hilson's improved strain of ragi again proved itself superior to all others and gave an increase of 92 per cent over ordinary varieties. That officer

has also evolved a strain of cholam (*jonna*) which is 33 per cent superior to its next rival and has beaten the local unselected varieties seven times out of eight. It would seem that his improved strains have not yet been given out on a field scale and some time must elapse before his work on ragi and cholam, and that of Rai Bahadur K. Ranga Acharya on grasses and Mr. Sampson on coconuts effect a marked improvement on these important crops.

The most serious problem which the Mycological section was called on to face was the spread of a paddy disease which, after disappearing in Tanjore where it had been prevalent the preceding year, was discovered in Coimbatore. The corresponding problem on the Entomological side was the presence of the pink bollworm which, though it had damaged cotton in Madras slightly for a long time previously, only sprang into prominence last year. In both cases, investigations are in progress and the prospects of ameliorating, if not of completely removing, the trouble are hopeful.

Mr. Wood admits that the record of his Department in improving the live stock of the Presidency is not one to be proud of and frankly states that no progress can be expected until the Department produces good bulls of its own. The Government review mentions that the opening of a cattle farm in the Kangayam tract is under consideration and hopes that "some progress" will be made during the current year at the cattle breeding station at Chintaladevi in the Nellore district. We trust that the matter will not end with pious hopes. The Madras Agricultural Department has so much to its credit in other respects that its desire to "get a move on" in other directions cannot be doubted. Mr. Wood is equally candid in regard to the work of the agricultural associations. Only a few of them, in his opinion, are doing any useful work. The rest are a hindrance rather than a help and depend for their existence on the interest taken in them

by the frequently changed and usually over-worked District officer. It is a pity that some of the superfluous energy which is at present being devoted by the best intellects of India to politics cannot be diverted to the less showy but equally valuable work of stimulating agricultural and co-operative progress.

Another disappointing feature of the Report is the deterioration in quality of the applicants for admission to the Coimbatore College. Mr. Wood was himself Principal of the College for eleven years and so he speaks of what he knows. The number of applicants for admission to the College showed no diminution but Mr. Wood considers that there is little chance that any of the present class of students will ever be fit for the higher posts in the Department. He thinks that it is clear that an agricultural career offers little attraction to the youth of the country. He offers no suggestion as to how the problem is to be solved. The Madras Government say that they are "anxiously considering the possibility of attracting a better class of recruits in numbers sufficient for the needs of the Department and hope that a solution will be found whereby the College will be able to produce men of a really adequate standard of training." Their solution will be awaited with interest for the problem is by no means peculiar to Madras.

We notice one bad misprint. In the section of the Report in which the work of the sugar-cane breeding station is described, we are told that the season was a bad one for "harrowing." It should, of course, be "arrowing." We would suggest that, in future reports, a map of the Presidency showing the different Circles, should be inserted. The reference to the Circles by their numbers only leaves the readers in doubt in which parts of the Presidency work on the various crops is in progress.

THE INDUSTRIAL DEVELOPMENT OF SOUTH INDIA.—II.*

MANUFACTURES.

BY GILBERT SLATER, M.A., D.Sc.,

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INDUSTRY is the adaptation of natural material to human needs. In some cases the process is simple and direct. A ryot grows paddy, his wife husks it and cooks the rice, the family eats it. There is here only a short chain of industrial processes. In so short an industrial chain manufacturing industry, or what is recognized as such, does not appear. But instead the paddy may be sent to a rice mill, and there be husked, and thence be sent to some large town; and with the intervention of the rice mill there appears what is recognized as a manufacturing industry. Consider again the case of the cotton fibre, which is grown in the fields of Georgia, and sent to Augusta to be ginned, thence railed to Charleston, thence shipped and conveyed by steamer to Liverpool, railed again to Oldham, where it is passed in succession through the blowing rooms, the carding rooms, and the spinning rooms, and emerges as cotton yarn. From Oldham, it may go to Manchester to be dyed, and then to Rochdale to be woven into cloth, be shipped again from Liverpool to the Gold Coast, and finally delight the heart of a negress in Upper Nigeria. Here the industrial chain is lengthened considerably and all the industries of ginning, carding, spinning, dyeing and weaving receive the material in turn, and pass it onwards; but in this case also the journey starts from the gifts of nature and

ends with the satisfaction of a human want. And so is it if the process is more complex, as frequently happens in metal-working industries. However complicated the industrial processes may be, they still must necessarily be of the nature of links in industrial chains, all originating in the resources of nature and ending with the satisfaction of human desires.

Manufacture is therefore doubly dependent on agriculture and its kindred extractive industries forestry, hunting, fishing, mining and quarrying. From these it must receive the materials on which it works, and among the men who pursue these extractive industries it must find a large proportion of the consumers of its products, people who are willing in return to supply food as well as raw materials to the manufacturing population. A manufacturing country without agriculture and cut off from agricultural countries would be like the mythical group of families which lived by taking in one another's washing.

This is the cardinal fact that has to be kept in mind in considering the problem of the development of manufacturing industries in India. It is possible for a country to so develop its manufacturing skill and efficiency as to be able to depend, for food, for raw materials, and for markets, upon other countries. Thus Lancashire obtains raw cotton from America and Egypt, and sells the manufactured product in India, China, South America, Africa, Europe, the United States, and the British Colonies, and out of the payment for such labour buys grain and meat from all over the world to feed her operatives. But this is an exceptional feat, not easily imitated. So far as India is concerned, since it is on the one hand rich in natural resources, and on the other sustains a vast population, almost entirely by agriculture, it is wise to concentrate attention at first on forging links in industrial chains, at least one end of which is already here in India; and

*A lecture delivered in Madras. Part I was published in the January issue of this *Journal*. [Ed.-M. E. J.]

by preference in those of which both ends are here. In other words Indian enterprise should first apply itself to those manufacturing industries for which India itself supplies *both* the raw material *and* the market, and then to those for which India supplies *either* raw material *or* the market.

Some time ago I took a number of students over the Madras Harbour. There we saw in the godowns waiting for export at one spot a great collection of raw skins and hides, and at another a great mass of tanning materials. My students felt disgusted and ashamed at this evidence of the lack of enterprise and efficiency of Indian industry. As the skins and hides are here, and the tanning materials also, why not tan the skins and hides before exporting them? And as under peace conditions India imports millions of pairs of boots and shoes annually, to say nothing of a great variety of other leather manufactures, why not retain out of the tanned skins and hides enough to supply India with all the boots and shoes required in the country?

Text-books on Economics are apt to tell you that the factors of production are Land, Labour and Capital. I notice that people are apt to take hold of this statement, and reproduce it with the air of uttering a valuable truth. But without a good deal of explanation it does not help. It rather misleads than guides those whose desire it is to develop new agencies of production. Let me beg of you to use your own intelligence instead of going to text-books, and to consider what is necessary for success in production.

Let us suppose that a group of Madras men resolve on entering upon the tanning and boot and shoe making industries in combination. They have then two out of the necessary factors of production, (1) access to the necessary raw materials, (2) access to a sufficiently large market. What else do they require? Four more factors,

three of which are immaterial, or I may say, spiritual. They must have in the first place the enterprise to risk their capital resources, and the determination to go through with the undertaking to the end; they must have in the second place the intelligence to plan wisely, to choose the right site for their factory, to have it well designed, to enlist the right manager, sense enough to discard the Indian delusion that it is profitable to under-pay employees; they must have in the third place sufficient honour and business morality to abstain from attempting to cheat one another, or the people with whom they enter into business relations. And they must also have sufficient cash and credit to be able to buy land, erect buildings, equip them with plant and machinery, and employ labourers.

Once the business is well started success depends on good management. Good management has two aspects, external and internal. I have noted that the Madras University graduate in History and Economics has grasped the idea of good management in its external aspect. He understands the necessity of efficiency in the purchase of raw material and in the sale of the product. But, so far as I can discover, the idea of efficient internal management has never been the object of study among educated Indians, and I have found it very hard to give them any conception of what it entails.

The essence of it is enthusiasm for good and efficient work. Just as a painter should rejoice in beauty of form and colour, and a musician in beauty of tone and rhythm, so a works manager should rejoice in smoothness and effectiveness of organization. Just as the painter hates falsity and crudity of colour, the works manager should hate waste, waste of time, waste of material, waste of by-products, waste of space, and most of all, waste of human energy and working power. He must study the processes, so that the journey of the material from tool-point to tool-point, as it is subjected to different processes, shall

be short, quick and easy ; so that each tool works with the highest attainable efficiency ; and so that power is used without waste. He must study the problems of lighting, ventilation, minimising of noise, prevention of dust and of noxious gases ; he must above all study the men whom he employs, selecting them, grading them, and, if need be, shifting them from one task to another till each has the work suited to his character and capacity.

If therefore you are not able to secure good management, I would recommend you to keep away from manufacturing enterprises. But if you realize the nature and necessity of good management, and see how to secure it, together with these other essentials which I have mentioned, then there is a big field for manufacturing industry waiting for your efforts. Let us leave aside the years of the war, and go back to 1913-14, and see what goods India imported from abroad, while itself producing the raw materials, or at least the most important of the raw materials, from which they are manufactured. In the first place, we find imports of manufactured cotton goods to the value of Rs. 66,57,66,000, side by side with exports of raw cotton to the value of Rs. 41,04,25,000. India is extraordinarily rich in coal and iron, but the imports of iron and steel goods came to Rs. 16,00,79,000. Silk manufactures totalled Rs. 3,10,13,000, matches Rs. 89,65,000, paper Rs. 1,58,77,000, biscuits, cakes, patent foods and preserved milk Rs. 1,34,07,000, soap Rs. 75,06,000, earthenware and porcelain Rs. 63,49,000, and boots and shoes Rs. 79,26,000. The least important of these indicates an Indian market of over 60 lakhs per annum, affording quite sufficient scope for well-organized businesses.

On the other hand let me offer a caution. Do not be too imitative, too much like a flock of sheep all rushing through an opening immediately one has led the way. I have been in various towns in India where rice-mills have been started. The story I have

been told has been that at first they were very successful, but then more and more mills were started to seize a portion of the profits, till now they are too many for the district. Just the same report was given to me with regard to tile works on the West Coast. From the daily papers it would appear that there is a craze just now for Insurance Companies, and though so many are floated, yet the capital asked for has been in some cases even subscribed before the prospectus is out. I am not sure that India (or perhaps I should say Bombay) is not infected with a mania for plunging into ill-considered ventures somewhat like the time of the South Sea Bubble in England. We appear to have the same phenomenon of speculators greedily buying shares already at an absurdly high price in the expectation of their going higher still. That sort of mania is more likely to hinder than to help industrial development. I would strongly advise you if you have money to invest and are tempted by these new floatations, to wait a few months, and meanwhile take up stock in Government loans, and when finally you put money into some industrial company, do so with the intention of making that a permanent investment, and study its prospects thoroughly first.

Then, when you are in business, I hope you will shed the notion so common in India, that it is good business to pay the lowest possible wages. You will admit that the Americans know something about the art of making profits. There the manager is considered an able man, not because he pays the lowest, but because he pays the highest wage in his particular industry. You have heard no doubt of the Ford motor-cars, and that they are famous for four things, their great sale, their cheap price, the vast profits made by the manufacture, and the very high wages paid to the men who make them. Indian labour is extremely low paid. Some people say that it is not cheap, because low as the wages are the efficiency is lower still.

In particular sorts of work this may be so, but it is certainly not universally the case. In a great variety of employments Indian labour is very efficient in proportion to its cost, or, what means the same thing, very cheap in proportion to its efficiency. One of the most wonderful things in India is the Post Office. If you tell people in Europe that a letter with a half anna stamp, or a postcard with a three pies stamp, will be carried if so addressed from Aden for five days' journey by mail steamer to Bombay, thence many hundred miles by rail to Calcutta, thence again by steamer to Rangoon, then to the limit of the Burmese railway system, and finally many miles by runner, they find it hardly possible to believe that so much can be done at so ridiculously small a cost. And yet the Post Office yield a profit in aid of taxation. There you have clear proof that Indian labour of the type required for postal work is extraordinarily efficient in proportion to its cost. There is seldom any valid excuse for the very low wages that are customary. In my opinion the wise employer instead of trying to pay as small a wage as possible will always pay a wage high enough to make the man who gets it value his job, and be anxious to keep it. And he will encourage as many of the men whom he employs as possible, to try to do continually better work by giving just and fair increases of pay.

It is not the inefficiency of the ordinary workman which is, in my opinion, the chief obstacle to Indian industrial progress, but the inefficiency of the employing class. And if this is the chief obstacle it can be removed. India is not a country doomed to poverty by lack of natural resources. It is rather a country doomed to poverty because it has not yet taken the trouble to acquire the mental and moral equipment necessary to escape from poverty. Both public and private effort are necessary in order that India may acquire this equipment. Now is the time to concentrate energy upon this task.

Let me give you an example to illustrate the principles on which I think we ought to act. I have already referred to the old bad habit of exporting at once raw skins and hides and tanning materials instead of tanning the leather in India. You are doubtless aware of the fact that the war interfered with this crude method of dealing with these products, and that during the war the tanning industry developed enormously; the exports of raw skins and hides fell to half the pre-war figure and that of leather doubled. What is more important, the quality was excellent, and a new and much higher reputation for Indian leather was won. But this was because Government inspection stopped adulteration. Directly that inspection is withheld the practice reappears of soaking the hides in Epsom salts, to increase the apparent weight while spoiling the leather. Is it not a folly and a shame that this should be permitted? If we have no consideration for the foreign purchaser of Indian leather, if we have no regard for the good name of India in commerce, at least let us have some mercy on the honest tanner, who hates such methods, but is driven to adulterate like his neighbours, lest by competition with them he is driven to bankruptcy. A big firm can hold out, because it can get a name and reputation for its own goods, but the small man's goods are mixed up with the mass of the product, and he gets a price determined by the average quality of the whole. The small tanner who adulterates more than the average makes a profit, he who adulterates less makes a loss. It is a vile and horrible system, and as it has been proved during the war that inspection can be made efficient, it is the clear and manifest duty of the Government of India to maintain that inspection.

But the duty of Government in regard to industry is not confined to the negative function of preventing wrong-doing. There is also the positive duty of taking such action

for the encouragement of industrial development as under the particular conditions which prevail in India cannot be expected from private individuals and voluntary associations. Just as Madras can claim the best Agricultural Department of any Indian Province, so it can claim to have been the pioneer in this field. It was as far back as 1897 that Sir (then Mr.) Alfred Chatterton, of the Educational Service, demonstrated the possibility of establishing an aluminium industry in Madras. In 1905 the Government of Madras established its Department of Industries. But, alas! after a few years' working, there came from Lord Morley, Secretary of State, the following despatch which practically crushed the Madras Department and sent Sir Alfred Chatterton to take refuge in the State of Mysore. Here are the very words to which Lord Morley put his signature. I invite your attention particularly to the passages I have italicised.

"I have examined the account which the Madras Government have given of the attempts to create new industries in the province. The results represent considerable labour and ingenuity, but they are not of a character to remove my doubts as to the utility of State effort in this direction, unless it is strictly limited to industrial instruction and avoids the semblance of a commercial venture. So limited, interference with private enterprise is avoided, while there still remains an ample and well-defined sphere of activity. The limit disregarded, there is the danger that the new State industry will either remain a petty and ineffective plaything, or will become a costly and hazardous speculation. I sympathize with the Conference and the Madras Government in their anxiety for the industrial development of the province, but I think that it is more likely to be retarded than promoted by the diversion to State-managed commercial enterprises of funds which are *urgently required for the extension of industrial and technical instruction.*

"The policy which I am prepared to sanction is that State funds may be expended upon familiarizing the people with such improvements in the methods of production as modern science and the practice of European countries can suggest; further than this the State should not go, and it must be left to private enterprise to demonstrate that these improvements can be adopted with commercial advantage. Within the limits here indicated it appears to me that the

objects which the Industrial Conference had in view can all be accomplished by means of technical and industrial schools; *it is in such schools that a knowledge of new industries and new processes can best be imparted, that the use of new implements can be best taught and the technical skill of the artisans most readily improved.* In a leather school the method of chrome tanning can be demonstrated and taught; in a weaving school the indigenous hand-loom can be improved and the advantage of the improvement demonstrated. If the schools are properly managed they will supply the private capitalist with instructed workmen and with all the information he requires for a commercial venture. To convert the leather or weaving school into a Government factory in order to demonstrate that articles can be manufactured and sold to the public at a profit, goes, in my view, beyond what is desirable and beyond what is found necessary in other provinces. My objections do not extend to the establishment of a bureau of industrial information, or to the dissemination from such a centre of intelligence and advice regarding new industries, processes or appliances, provided that nothing is done calculated to interfere with private enterprise."

I want to draw your attention here to two obvious fallacies. In the first place, in writing about the diversion of funds from industrial instruction to industrial enterprises Lord Morley confused between current expenditure and investment of capital. If the Madras Government invests a lakh of rupees on building and equipping a soap factory it does not follow that it will have to withdraw a lakh of rupees from its expenditure on technical education, or on any other necessary annual expenditure. As there is every reason for supposing the venture will be successful it is probable that there will be more money, not less, available for technical education.

But a far worse mistake was made in supposing that technical education can be effective if suspended in the air, as it were, with no connection with any existing industry. When Lord Morley said "it is in such schools," *i.e.*, schools not associated with any workshop experience "that a knowledge of new industries and new processes can best be imparted," he was

saying the exact opposite of the truth, as any one experienced in technical education will tell you. Besides, supposing young men could be taught in Madras schools the processes of a new industry, what encouragement would there be to them to take the course, with no chance of employment afterwards?

Now, happily, as the result of the Indian Industrial Commission the policy of Lord Morley's despatch has been repudiated, and the old policy of the Madras Government vindicated. I hope therefore it will go ahead with courage and determination. But there is one thing I regret. It was in December 1915 that I came to Madras. Then Mr. Tressler was in charge of the department, of which Sir Alfred Chatterton was still nominally the head. Since then I have known as Directors of Industry Mr. Couchman, Mr. Innes and now Mr. R. W. Davies—four heads within the space of less than four years. I was appointed to my post by the University of Madras for a definite period of five years, as a minimum. I do not think that the minimum period for a University Professor is at all too long for a Director of Industries. I do hope that now we have Mr. Davies he will not also be hastily moved to some other job, to make room for yet another new man who will have to learn the work from the beginning.

There are many varieties of useful work possible for young men of good education in India besides entering into Government offices and practising as vakils. A strong Department of Industries, under an able head, pursuing a continuous policy, and well supported by Government and by public opinion, can turn these possibilities into actualities.

NOTE ON LAC*

BY E. C. ANSORGE, I.C.S.

LAC, the resinous excretion of certain scale insects, has been an article of export for more than three centuries. Although the true lac and other resin-secreting insects occur elsewhere, the commercial production of lac in any form is restricted to India (including Burma), Siam and Indo-China. Indo-China and Siam together probably only supply about 2 per cent to 2½ per cent of the total production of sticklac, and even of this quantity a considerable proportion is exported to India *via* the Straits Settlements for manufacture into shellac. Thus the total export of sticklac from Siam between 1910 and 1915 was as follows:—

TABLE 1.—Exports of sticklac from Siam and French Indo-China.

Country,	Year.	Cwts.
Siam	1910-11	11,147
	1911-12	6,708
	1912-13	16,272
	1913-14	18,070
	1914-15	6,553
French Indo-China.	1911	4,525
	1912	6,850
	1913	10,318
	1914	4,588
	1915	1,805

* With acknowledgments to the *Industrial Handbook*, 1919. For further information see Cotton's "Handbook of Commercial Information for India," obtainable from the Superintendent, Government Printing, India, Calcutta.

Imports of sticklac from the Straits Settlements into British India in recent years are shown below:—

TABLE 2.—Imports of sticklac from the Straits Settlements into British India.

Year.			Cwts.
1912-13	...	...	8,201
1913-14	...	...	13,303
1914-15	...	...	977
1915-16	...	...	2,110
1916-17	...	...	274.

An average crop of sticklac from all sources is probably well over 725,000 cwt., from which it will appear how considerable a monopoly is held by this country.

DISTRIBUTION.

There are four main lac-producing areas in India, viz.:—(1) the Central India area, including the Chattisgarh, Nagpur and other divisions in the Central Provinces, Chota Nagpur and adjacent districts of Orissa and Bengal and the north-eastern forests of Hyderabad State; (2) Sind; (3) Central Assam and (4) Upper Burma and the Shan States. Lac is grown in other areas, as for example in certain districts of the Punjab, but large quantities are collected only in these four areas. Of these the most important is the large and scattered area in and around the Central Provinces from which the manufacturers draw the bulk of their supplies. The raw sticklac is manufactured into shellac in a large number of small factories in the United Provinces, Bengal and Behar, the most important localities being Mirzapur, Balarampur, Imamganj, Pakur and Jhalda. In addition to these, there are two concerns in Bengal where machine-made shellac is manufactured by patent processes.

The insect occurs on a large number of different trees, and the nature of the host is a most important factor in the production of good lac. The best is grown on the *kusumb* (*Schleichera trijuga*), but the *ber* (*Zizyphus jujuba*), *palas* (*Butea frondosa*), *sisir*

(*Albizzia lebbek*), and *pipul* (*Ficus religiosa*) have all been recommended for the propagating of the insect. In the Central Provinces, lac is largely found on the *kusumb* and *palas* trees, but in Sind it is chiefly grown on the *babul* (*Acacia arabica*).

It has long been recognized that there are several insects of the genus *Tachardia* which produce lac. The most important is *T. lacca* Kerr, but *T. fici*, Gr. and *T. albizziae*, Gr. are also said to yield lac on a commercial scale. It has been found that the Sind *babul* lac has not thrived when transferred to *babul* trees in Bihar, and it is probable that the various grades of lac are not due solely to the trees on which the insects feed, but probably even more to the fact that they are produced by different species of the lac insect. The question is, however, one which has not been at all thoroughly investigated, though it is of very considerable practical importance, the various species having not only differing food plants but also differing seasons.

MANUFACTURE.

It is not proposed to discuss here in detail the production and manufacture of shellac, but a short description of the methods employed, and the various stages through which the material passes, will be necessary, as reference will have to be made hereafter to certain points relating to this subject, which are at present disputed or which require fuller investigation. The ordinary process is briefly as follows:—The raw material (*i.e.* the lac incrustated round the twigs of the tree from which it has been obtained, or sticklac) is first of all removed from the twigs, leaving only a small quantity of wood adhering. The lac is then ground and sifted, the dust being separated, after which it is washed free of dye and the resultant seedlac dried and graded into *granular* and *dust*. The seedlac is then manufactured into shellac by fusing it before a fire. A small quantity of pigment (trisulphide of arsenic)

is frequently added to produce the light yellow colour required in the finer grades of shellac, and a small admixture of rosin is also sometimes made to lower the melting point, and the mixture is fused by twisting it in long narrow bags before an open fire. The molten lac squeezed through the bags is when sufficiently roasted, placed on a porcelain cylinder containing hot water and spread out uniformly by means of a ribbon of palm leaf into a thin sheet. The lac is now removed from the cylinder, trimmed into a rectangular form, and stretched out into a still thinner sheet. When cold, these sheets are assorted according to colour, and thick pieces, impurities, etc., are broken out, the rejected portions being replaced in the bags for re-melting. In the case of garnet lac, which can only be made from Assam and Rangoon sticklac, if it is to have the required ruby tint, the process used to be much the same, but the lac was not again stretched after being removed from the cylinder. Garnet lac is, however, no longer made by hand, and its manufacture is now confined to the spirit or "wet" process. In the case of button lac (which is shellac in everything but form) the molten material is dropped on to a smooth surface instead of being stretched.

The principal commercial forms of lac are, (1) *sticklac* (the crude material); (2) *seedlac* or *grainlac* (sticklac crushed, washed and dried, in the process of manufacture into shellac); (3) *shellac* (various grades of the manufactured article in flakes); (4) *button lac* and *tongue lac* (the same, but melted into button or tongue shape). It can be made from any grade of sticklac, but is usually from a medium to good; (5) *garnet lac* (dark red lac melted into thin slab form but not reduced to flakes. It is usually made to contain 10 per cent rosin) but can be made pure. Lower qualities of this and of button lac can also be made by an admixture of lac refuse; (6) *kiri* the residue left in the bags after the melting process, which contains a

percentage of lac, sometimes as much as 50 per cent or even more).

The process above described, as practised in the small up-country factories, demands considerable skill and appears to be on the whole very satisfactory. It is generally admitted that machine-made lac cannot successfully compete, at any rate in certain grades, with the handmade article. Except for deliberate adulteration (of which there is unfortunately a great deal when the demand is large), handmade shellac seems to be all that is required for the various purposes to which lac is put, and no complaints are raised by consumers, except as regards adulteration.

USES.

These purposes are many and various, and have increased surprisingly during the last few years. Besides its use in the manufacture of gramophone records, sealing wax, buttons, lithographic inks, corundum and emery wheels, imitation ivory, oil cloth, etc., and as a constituent of varnishes and polishes and a stiffening for silk and straw hats, shellac is now employed in the making of electric insulators and explosives, and has therefore become an essential military necessity. In India shellac or its residuary by-products (such as *kiri*) are very widely used for the making of bangles, bracelets and toys, as a cement, for the ornamentation of ivory or metal ware, for filling ornaments, fastening the hafts to swords, etc., and in the manufacture of innumerable articles of common domestic use in the villages.

The use of shellac in the manufacture of military requisites brought it into great prominence during the war, and arrangements had to be made to secure sufficient supplies for the Ministry of Munitions. The annual requirements were estimated at 50,000 cwt. to be distributed amongst the various allied Governments, and by agreement with the shellac shippers in Calcutta a scheme was introduced in January, 1917, whereby the shipment of lac was prohibited to all destinations, but licenses were freely

given on condition that against every export on private account a consignment of shellac corresponding to 20 per cent of the quantity exported, and of a certain specified quality, was guaranteed to Government at a fixed f. o. b. price of Rs. 42 per maund of $82\frac{2}{5}$ lbs. Owing to the difficulty of obtaining sufficient quantities of the Government quality, the Ministry of Munitions eventually agreed to take a certain portion of their requirements in commercial T. N. London standard. The Government percentage is calculated on the amount of shellac in each variety of lac exported, the fixed standard being 90 per cent in the case of seedlac, 70 per cent in that of sticklac, and 40 per cent for refuse lac. Through the co-operation of the shellac shippers, this scheme has worked very successfully and has resulted in the supplying of 80,000 cwt to the Ministry of Munitions in 22 months since January, 1917, a quantity which seems to have been fully sufficient for all purposes.

MARKS AND STANDARDS.

The major portion of the lac that leaves India is in the form of a dark orange shellac known as T. N. and is mainly derived from *palas* sticklac. In London each year a sample representing the average quality of the lots of common shellac arriving from India is standardised and quotations are made on the T. N. basis, the T. N. quotation being the standard quotation in both markets.

Shellac is packed for export in two maund cases, weighing approximately $1\frac{1}{2}$ cwts. or in double gunnies.

TRADE ORGANIZATION.

The organization of the shellac trade has been criticized on account of the number of middlemen involved. The actual collectors of sticklac sell to *bantias* interested in the trade (*arhatias*), who supply the small manufacturers and between the latter and the actual shippers brokers again intervene. The whole chain is financed by the usual system of advances, even the small manufacturer

frequently receiving advances from a Calcutta broker and binding himself to supply that broker only in return. It is obvious, however, that such criticism is ill-founded. Under ordinary conditions, the division of labour and consequent division of risk is essential in a modern industry, and it is clear that the broker plays a necessary part in bringing buyer and seller together and is entitled to a share in the profits of the industry. Were the buyer to take steps to enter into direct relations with the seller or *vice versa*, he would clearly be entitled to an increased profit on account of increased labour and increased risk. By co-operation among the sellers the mofussil broker might be eliminated, the whole body of co-operators becoming their own broker, but in that case there would arise the difficulty already experienced in many industries that an increase in profits is merely followed by a reduction of labour, and in consequence the total output would be proportionately reduced. On the whole, there does not seem to be any reason to suppose that the trade could be organized more economically than at present.

In the export trade, the shellac is usually sold on three or four months' sight drafts—*viz.*, 3 months on shipments to Europe and 4 months on shipments to the United States of America,—against letters of credit in London. It is c. i. f. to Europe and c. f. to the United States of America, the importers of that country generally preferring to arrange for insurance themselves. Occasionally small quantities are sold on consignment, but this is not frequent.

TRADE STATISTICS.

The importance of the shellac trade is illustrated by the figures given below. It will be noticed that exports have very greatly increased since the period preceding the last ten years, the increase in the value of the trade being accentuated by the rise in prices on account of the war.

TABLE 3.—Exports of manufactured lac (shellac and button lac) by sea from British India to foreign countries.

Year.			Shellac.		Button lac.		TOTAL.	
			Cwts.	Rs.	Cwts.	Rs.	Cwts.	Rs.
1868-69	..	...	43,746	11,65,869	...	...	43,746	11,65,869
1878-79	..	...	64,498	22,24,843	17,114	5,46,061	81,612	21,70,904
1888-89	..	...	81,390	31,94,125	21,195	7,88,702	102,585	39,82,827
1898-99	..	...	146,395	70,07,781	31,602	15,52,740	177,997	85,60,521
1908-09	..	...	322,953	2,46,51,307	31,415	23,33,005	354,368	2,69,84,312
1909-10	..	...	461,056	2,46,42,640	49,455	25,40,259	510,511	1,71,82,899
1910-11	..	..	357,940	1,92,92,267	31,278	15,87,205	389,218	2,08,79,472
1911-12	..	...	351,175	1,78,11,215	29,684	15,57,306	380,859	1,93,68,521
1912-13	..	...	336,176	1,76,81,250	41,498	21,86,106	377,674	1,98,67,356
1913-14	..	...	275,357	1,69,78,138	21,865	13,07,089	297,222	1,82,85,227
1914-15	...	...	307,845	1,41,14,691	25,526	12,47,039	333,371	1,53,61,730
1915-16	...	...	358,661	1,54,73,836	12,610	5,72,656	371,271	1,60,46,492
1916-17	..	...	324,284	2,55,03,984	3,109	1,94,875	327,393	2,56,98,859
1917-18	..	...	289,676	2,59,14,763	2,759	4,24,229	292,435	3,63,38,992
1918-19	..	...	222,880	2,79,93,953	3,520	5,62,906	226,409	2,85,56,949

Exports of sticklac and other kinds (including seedlac, *kiri*, refuse lac, etc.), are very small, as shown below :—

TABLE 4.—Exports of unmanufactured lac (sticklac and other kinds.)

Year.			Sticklac.		Other kinds.		TOTAL.	
			Cwts.	Rs.	Cwts.	Rs.	Cwts.	Rs.
1868-69	...	...	4,136	66,718	8,928	2,43,516	13,064	3,10,234
1878-79	..	...	1,409	18,604	141	2,364	1,550	20,968
1888-89	...	...	126	2,646	766	17,271	892	19,917
1898-99	...	...	739	23,533	3,380	1,29,890	4,119	1,53,423
1908-09	...	...	4,871	2,45,454	21,577	7,17,196	26,448	9,62,650
1909-10	...	...	6,208	1,73,921	38,077	3,59,898	44,285	5,33,819
1910-11	...	...	1,246	43,390	31,164	5,05,714	32,410	5,49,104
1911-12	...	...	1,596	62,185	45,551	7,09,699	47,147	7,71,884
1912-13	...	...	16,628	3,84,039	33,861	8,81,789	50,489	12,65,828
1913-14	...	...	1,196	51,732	40,743	13,21,042	41,939	13,72,774
1914-15	...	..	1,129	40,699	32,192	6,55,005	33,321	6,95,704
1915-16	...	...	3,519	1,14,190	42,530	10,15,130	46,049	11,29,320
1916-17	...	...	7,459	3,51,845	46,497	19,80,995	53,956	23,32,840
1917-18	...	...	1,504	1,13,250	28,481	13,25,792	29,985	14,39,042
1918-19	...	...	4	400	12,686	9,27,252	12,690	9,27,662

It will be seen from the above table that, although prices have risen considerably, there has been no marked increase of exports of the unmanufactured article of recent years.

Exports of lac dye have for several years practically ceased. Since 1912 separate figures are not available for this article, but the figures for preceding years will show that such exports are negligible.

Year.	Cwts.	Rs.
1868-69	17,748	7,95,655
1878-79	8,261	1,95,285
1888-89	334	8,038
1908-09	6	200
1909-10	6	80
1910-11	18	180
1911-12 ... ..	...	...

The total value of the export trade now amounts to over $3\frac{3}{4}$ crores, and even though this figure is partly due to the inflation of prices on account of the war, it will be seen that even ten years ago the value of the trade was $2\frac{3}{4}$ crores. The following table will make this clear.

TABLE 6.—Total exports of lac from British India by sea.

Year.	Cwts.	Rs.
1868-69	74,558	22,71,758
1878-79	91,423	29,87,157
1888-89	103,811	40,10,782
1898-99	182,122	87,14,144
1908-09	380,822	2,79,47,042
1909-10	554,814	2,77,16,898
1910-11	421,628	2,14,28,576
1911-12	428,425	2,01,45,040
1912-13	428,163	2,11,33,184
1913-14	339,161	1,96,58,001
1914-15	366,692	1,60,57,434
1915-16	417,320	1,71,75,812
1916-17	381,349	2,80,31,699
1917-18	322,420	3,77,78,034
1918-19	239,099	2,94,84,601

The distribution of the exports in the last pre-war year and in 1918-19 is shewn in table No. 7.

TABLE 7.—Distribution of exports of lac in the year 1913-14 and 1918-19.

Country.	1813-14.		Total.	1918-19.		Total.
	Manu- factured.	Unma- nufac- tured.		Manu- factured.	Unma- nufac- tured.	
	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
United States of America.	130,968	22,461	153,429	100,106	8,039	108,229
United Kingdom.	91,160	6,609	97,769	67,376	4,104	71,480
Germany.	41,582	11,182	52,764	...	...	...
France.	12,202	81	12,283	9,796	539	10,335
Other countries.	21,310	1,606	22,916	49,041	8	40,049

Imports are of course very small, and are practically limited to the regular imports of sticklac from Siam and Indo-China *via* the Straits Settlements. In 1868-69, the total imports of lac of all kinds amounted only to 1,233 cwts., valued at Rs. 19,814. Ten years later, the imports of sticklac were only 560 cwts. valued at Rs. 13,630. By 1888-89 they had risen to 1,845 cwts. valued at Rs. 40,645, and in 1898-99 they stood at 1,552 cwts. valued at Rs. 37,004. The figures for the last ten years are given below, those from 1908-09 to 1911-12 representing imports of sticklac, and thereafter for stick and seedlac combined.

TABLE 8.—Imports of lac into British India by sea.

Year.	Cwts.	Rs.
1908-09	1,773	87,555
1909-10	865	34,066
1910-11	2,670	83,345
1911-12	1,676	50,145
1912-13	10,903	2,53,334
1913-14	13,318	3,91,682
1914-15	977	33,711
1915-16	2,112	62,784
1916-17	20,804	7,35,197
1917-18	10,349	4,76,329
1918-19	3,609	2,61,767

ESTIMATE OF PRODUCTION.

It is difficult to frame any accurate estimate of lac production on account of the difficulty of obtaining reliable information as to the sticklac crop. The whole trade would undoubtedly benefit very greatly if accurate forecasts of the crop were regularly available, but there are very great difficulties in the way of preparing such forecasts. The shellac trade has always been highly speculative, and accurate reports as to the prospects of the crop would minimize the frequent and wide variations in the market value of the article. Unofficial attempts have sometimes been made by persons interested in the trade to forecast the various crops and recently forecasts by Mr. Lucas have appeared for the "Bysaki," "Katki" and "Kushmi" crops (*vide* "Capital" for April 19th and November 8th, 1918). In these, the "Bysaki" crop was estimated at 475,000 maunds.* or (reckoning 18 seers of shellac to every maund of sticklac) 213,750 maunds of shellac or about 107,000 chests. The "Katki" and "Kushmi" crops are estimated at 191,000 maunds and 116,000 maunds, respectively, or, taking the former at the rate of 16 seers to a maund of shellac and the latter at 22 seers, 76,400 (38,200 cases) and 63,800 (31,900 cases), respectively. These later crops are, however, little more than 8 annas corps, and an average crop may be roughly taken to be as follows:—

TABLE 9.—*Estimate of average total sticklac crop.*

Place of origin.		Mds.
<i>India proper—</i>		
Bysaki crop	...	450,000
Jethwa "	...	25,000
Kushmi "	...	170,000
Katki "	...	280,000
TOTAL	...	925,000
Burma and Assam	...	75,000
Siam and Indo-China	...	25,000
TOTAL	...	1,025,000 maunds or 751,667 cwts.

* 1 cwt. = $1\frac{4}{11}$ maunds.

Practically the whole of this quantity is manufactured in India, only some 10,000 maunds being exported from Siam and French Indo-China direct to Europe. There are thus left 1,015,000 maunds of sticklac, which will give roughly the quantity of shellac shown below:—

TABLE 10.—*Estimate of average production of shellac.*

Crop.	Sticklac in mds.	Percentage of shellac obtained.	Shellac in mds.
Bysaki ...	450,000	45%	202,500
Jethwa ...	25,000	50%	12,500
Kushmi ...	170,000	55%	93,500
Katki ...	280,000	40%	112,000
Burma and Assam ...	75,000	60%	45,000
Siam and Indo-China	15,000		
TOTAL...	1,015,000 maunds or 744,333 cwts.		474,500 maunds or 347,966 cwts.

To this figure must be added about 7,000 maunds of *kiri* which will in turn give about 3,500 maunds of shellac, making a total of 478,000 maunds or 350,733 cwts. of shellac available for export, or 239,000 cases, giving a monthly export of about 20,000 cases. This is rather above the average, but the difference is accounted for by the very considerable internal consumption of the various forms of lac.

INCREASE OF PRODUCTION.

This production might be almost indefinitely increased. Steps are already being taken in Hyderabad State to this end and the increase is practically only limited by the amount of labour available. In the past, the difficulty and expense of obtaining healthy brood-lac has been a serious obstacle to the extending of lac cultivation, and the establishment of nurseries for the supply of such brood-lac in various centres has been frequently recommended. At present, it is not unusual for a lessee who has received a concession

for collecting lac in a certain tract to strip the forest of lac in the year in which his lease expires, leaving practically nothing to propagate the insect afresh. Elsewhere the system of royalties exists, the royalty sometimes varying according to the price of shellac in Calcutta. This system, however, appears to have been very unsuccessful in Burma and Assam, and to have led to a very heavy fall in exports. Generally speaking, lac is cultivated and not merely collected wild in the forest, and a fine upon the cultivation of a particular article is bound to influence the cultivator in deciding what crop to cultivate. There is also the great likelihood that, when a royalty is imposed from the top, it will grow greater as it passes through the various channels on account of the exactions practised by subordinates, until it assumes proportions which may weigh very heavily on the cultivator. The solution of the whole difficulty would appear to be the direct leasing of collecting rights to the actual cultivator, so far as possible, and the exclusion of a certain percentage of brood-lac from the concession, this quantity being reserved by the lessor for the propagation of the next crop.

FUTURE PROBLEMS: ADULTERATION.

In addition to the question of the leasing of concessions, the most important problems connected with the lac trade are, first, adulteration, and, second, the form in which the article may best be exported. Of these, the former is by far the more serious, the latter being now, it may safely be said, practically settled. Complaints on the score of adulteration have been made from the United Kingdom, from the United States of America, and in Calcutta, but not entirely on the same grounds. In the United Kingdom, attention has been directed to the large admixture of rosin found in much exported shellac, and it has been suggested that the simplest method of dealing with this would be the standardization of the several forms in which lac is exported. It is generally stated or assumed

that an admixture of rosin (up to 3 per cent) is necessary for the manufacture of shellac, but it is alleged that, when prices are high, shellac may be adulterated with anything up to 50 per cent of rosin. In the first place, it does not appear to be true that rosin is necessary, and it certainly is not used in all factories. It is perhaps required to soften old sticklac which has been left unmanufactured for 4 or 5 years, when such sticklac is not refined by the spirit process, but there is nothing to show that it is required in any other case. On the other hand, there is undoubtedly a certain demand for a mixture of rosin and lac for certain purposes, and in such cases it is a confusion of terms to speak of adulteration, the mixture being simply a blend and not *adulterated* lac at all. In any case, the remedy lies not in the defining of standards (as such standards already exist and are well established), but with the importers. These can safeguard themselves by insisting not only that contracts should contain a clause declaring the percentage of rosin allowed (if any) and guaranteeing purity under chemical analysis, but also that a penalty should be exacted on any import of shellac which contains more than a certain fixed percentage. This has been done in the United States of America, where an admixture of 3 per cent rosin is allowed in U. S. A. T. N. (corresponding to London T. N.) but in the case of N. Y. T. N. and "superfine" grades the shellac must be pure, and a special penalty is inflicted by the Shellac Importers' Association if any shellac is imported containing more than 5 per cent rosin. In London, on the other hand, although some of the contract forms were modified in 1904 by the insertion of a clause restricting the rosin admixture for shellac to 3 per cent and for garnet to 10 per cent, no such clause was inserted regarding button lac, and no penalty was insisted on to prevent the import of private standard marks containing a far greater percentage. The result of this omission has naturally been that it is open

to an unprincipled importer to buy rosinous shellac and sell it to the small consumer, who is unable to afford to buy on chemical analysis, as the pure article. A further difficulty has sometimes arisen through the different results obtained by Calcutta and London analyses, although the Calcutta and American analyses seem to be identical. This is a point which could probably be best dealt with by a shellac association, the institution of which is recommended below.

With regard to America, the question of adulteration assumes a totally different form. In this case, no difficulty is experienced with regard to rosinous shellac on account of the strict regulations and severe penalties mentioned above, but complaint is made that a considerable percentage of other impurities is frequently found. There is no doubt that such complaints are well-founded. During the last few years it has been found that molasses, powdered clay, powdered lac refuse, and flour have been mixed with the shellac, and that by the use of unusually porous cloth bags in the melting process a large proportion of the impurities in grain lac ooze out into the refined shellac. The Calcutta shellac contract contains a clause guaranteeing the shellac not to contain more than a certain percentage of *rosin and other impurities*, the penalty being 8 annas per maund for every 1 per cent up to 4 per cent above the allowed amount, and Re. 1 per maund for every 1 per cent in excess. Shellac has, however, only been tested for rosin, and the guarantee regarding other impurities has hitherto been a dead letter. Recently some firms have attempted to insist upon this clause, but certain others have held back, the custom of the trade being at present in favour of the latter. In such a case, it would undoubtedly be of great benefit to the trade if there were a recognized shellac association which could decide such points as this. If it is clear that it would concern itself only with the policing of the trade, standardization of contracts, arbitration

and kindred matters, there is no reason to believe that the formation of such an association would meet with any opposition.

SHELLAC *versus* SEEDLAC.

The second point which has raised considerable dispute in this country is the form in which the export should be made. It has been urged on more than one occasion, and even in semi-official publications, that there seems to be no reason why so large a proportion of the lac exported should be laboriously converted into shellac instead of being exported as seedlac, the consumers being themselves able to make any addition required for special purposes. It is argued that a clean grain lac free from dirt should answer the purpose of many consumers better than shellac. This contention is based upon the following assumptions, *viz.*, (1) that seedlac is a purer article than shellac, the latter being adulterated by rosin and orpiment; (2) that seedlac would be as suitable to the consumer as shellac and is only not used because it is not known; (3) that seedlac does not "block" in transit. All these three claims on behalf of seedlac appear to be mistaken. In the first place, seedlac is the condition of the raw material after washing and before manufacture. It contains many impurities which are left in the bags when the lac is roasted, and all these would be present in the exported seedlac. The assumption that seedlac must contain an admixture of rosin is certainly wrong: there may be present a small percentage of natural tree rosin, but this will be equally present in the seedlac, and, as has been mentioned above, the further admixture of rosin to lower the melting point is not a necessity of manufacture. The United States of America insists upon receiving pure shell and button lac for all superfine grades. Similarly, the admixture of orpiment is a matter of appearance and is made to give the requisite orange tint. In the finest quality shellac there is practically none (perhaps $\frac{1}{2}$ per cent), and in

button lac none at all. Manufacturers are sometimes asked to add orpiment, which cannot rightly be regarded as an adulterant. The contention that seedlac is purer than shellac, or even as pure as cannot hold water.

Secondly, it is certainly not the case that the consumer would ordinarily find seedlac suitable for all or most of his purposes, if he knew of it. The United States Shellac Importers' Association (which is the largest association of its kind and which represents the interests of the importers of all forms of lac) has given its opinion on this point that seedlac has its purposes but would not substitute for lac in shell form, which for general purposes is superior to the seed form. The London Shellac Association has expressed an identical opinion. Even without this categorical denial of the claim, it would be a very unsafe assumption that the buyers of an article like lac are unaware of the form most suitable for their requirements.

Thirdly, it appears to be erroneous to claim that seedlac does not "block" (*i.e.*, coagulate into a solid mass) during transit. The whole weight of the evidence of those persons most concerned with the trade is that seedlac "blocks" as readily as shellac or even more so. Finally, those who urge the superior claims of seedlac as an article of export lose sight of two most important points, *viz* : (1) that seedlac becomes insoluble very much more readily than either sticklac or shellac (manufacturers therefore ordinarily protect themselves against a loss by converting stick into seedlac only in such quantities as can be immediately converted into shellac), and (2) that a general substitution of seedlac for shellac in the consuming markets would mean the ruin not only of the shellac industry but also of all those industries which rely upon the by-products of shellac (*i.e.*, *kiri*, which is used in the bangle and bracelet-making industries) for their raw material. In view of these facts, the whole question may now be regarded as definitely settled.

LAC DYE

There are a number of other questions connected with the lac industry which cannot be discussed here in detail. For example, the question of the lac dye is of great interest inasmuch as it was originally almost wholly for the production of the dye that lac was collected. In recent years, the export of lac dyes has disappeared, both on account of the competition of synthetic dye and because of the vastly increased number of uses to which the rosin can be put. The dye is still said to be used for artistic rugs and *saris* in certain parts of India in preference to the synthetic article, and if this is so it is certainly regrettable that practically all the lac dye produced is at present thrown away. It has been suggested that the dye liquor might be used as a manure, on account of the rich supply of nitrogen contained in it, but though some attempts have been made to establish this on commercial basis they have hitherto been unsuccessful. This has apparently been due to the absence of a sufficient quantity of phosphates in the dye-cakes, and it is probable that although the dye liquor may have a high manurial value if run straight on to the fields and allowed to decompose there, the dry dye-cakes have far less value for the purpose.

LAC WAX.

Again, there is a certain demand for lac wax, which is said to be of use for boot polishes. The wax is not, however, ordinarily separated from the resin in the manufacture of shellac, and when so separated (as in the spirit process) the value of the resultant lac resin as shellac is said to be inferior. Further investigation of this and kindred questions, however, would very possibly have valuable results, and it cannot be said to be certain that the fullest possible use is yet being made in India of the natural monopoly of the lac industry.

THE TEACHING OF ECONOMICS IN INDIA.*

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- I. Economic Libraries.
- II. Economics in the University of Madras.

I

THE WORLD'S GREAT ECONOMIC LIBRARIES.

An earnest and a sincere student of Economics must, for purposes of a proper study of the subject, have access to Economic Libraries of the sort mentioned below :—

1. The Goldsmiths' Company's Library of Economic Literature.
2. The various Manchester libraries like the Portico Library, the Library of the Manchester Statistical Society, etc.
3. Foreign Office libraries in England.
4. The various U. S. A. libraries like the John Crerar Library, Chicago; Private libraries like those of Prof. Seligman of Columbia University and Prof. R. T. Ely of the University of Wisconsin.

I do not think that either the Indian University Libraries or the private libraries of college professors of economics answer to those of the foregoing type, though I must at the same time frankly acknowledge my personal acquaintance with Indian economic libraries is confined to a few college libraries in Madras, Trichinopoly, Kumbakonam,

Trivandrum, Mannargudi and the private library of a distinguished professor of Economics in Travancore. Let me say a few words on the typical foreign libraries before I directly or indirectly set forth my ideal of economic libraries in India as a necessary equipment for any individual student of economics or an Indian school of Economics like the London school which must sooner or later arise for a good organization of economic studies in our country.

The Goldsmiths' Company's Library of Economic Literature :—

'This is a collection of books and tracts intended to serve as a basis for the study of the industrial, commercial, monetary and financial history of the United Kingdom as well as of the gradual development of economic science generally.'

Look at the manifold types of economic literature represented in the library. (p. 720, Palgrave, vol. iii.) The topics range from the earliest history of English trade up to the most up-to-date economic topic of interest. There is a fair collection of not only economic literature in English but also in Italian, Spanish, Dutch, etc. 'No pains or expense have been spared to ensure that, as far as possible, all sides in a controversy should be represented.' Besides books ranging in number from thirty to forty thousand, there are hundreds of manuscripts, a good many autograph letters of standard economists and statesmen, sample copies of varieties of paper money and regular cart loads of statistical information of a very rare value.

The chief object of this and several other famous economic libraries is evidently to facilitate economic research in many directions and save the enormous expense to the research scholar of economics who, if he has no access to such a valuable store-house of

*A paper read before the Third Conference of the Indian Economic Association.

literature, would find the necessary expense a great strain on his petty and modest income.

THE MANCHESTER LIBRARIES.

It is no wonder that Manchester of industrial fame can boast of many useful libraries. I gather that some collections contain 'much unused material for the history of commerce and industry.' One library has 60,000 vols; another 1,00,000; a third 1,10,000; a fourth 1,55,000. The last figure is the number of books in the Reference Library with 'literature of political economy in its widest sense.' The second of the above figures gives the number of books in the Economics section of the University of Manchester. The important collections made by Professor William Stanley Jevons come to about 2,394. Such a literary reservoir of storehouses of economic information cannot but enable earnest and willing students of economics to conceive fruitful inductive hypotheses and fresher and fresher fields of economic investigation.

THE FOREIGN OFFICE LIBRARY.

It is said that this library has many reference works dealing with the Colonies and many other countries in the world. Most of its works are very rare and must hence be presumably of supreme significance to any patient writer of economic history.

THE U. S. A. LIBRARIES.

Besides the Crerar and the Newberry libraries of special interest, the Congressional library at Washington and the several University Libraries and those attached to the various Historical and Economic Societies in the U. S. A. abound in huge collections of treatises on Economics of all shades of thought, and a vast deal of periodical and pamphlet literature though of mostly American colour, dealing with finance, money, banking, free-trade and protection and a host of other important topics. Of the private libraries, the most notable is that of Prof. Seligman of the Columbia University. It

has about 30,000 volumes on Economics. It is no wonder that a professor of such resourcefulness should produce excellent treatises on Economics and Finance. The private library of Prof. R. T. Ely of Wisconsin University (sold in 1902) had covered the whole of political economy, though specially strong in works dealing with American labour and social movements. *The John Crerar Library, Chicago.*—This deserves special mention amongst the world's economic libraries for the large numbers of volumes in the department of social sciences. The social sciences alone have in round figures 55,000 volumes (about 18 per cent of the total number in the library) of the eleven divisions into which the department of social sciences has been divided 'the most important is political economy with about 16,000 volumes and 12,000 pamphlets.' 'Commerce and communications' which has been treated as a separate division of the social sciences is credited with about 2,500 volumes. It has also often taken advantage of fresh additions to the library by buying private libraries whenever offered for sale. Documents congressional of the U. S. A., early and later parliamentary papers of England, and many serial official publications of Sweden, Austria, France and Germany (all dealing with economic subjects) are to be found in large numbers in the library. There are about 500 periodicals on the social sciences besides 8,000 volumes of society transactions offering much material to the student of social sciences. Another most delightful feature of the library is the list of bibliographies of special subjects giving 'not only the distinctly bibliographical works on each subject but also the works which contain bibliographical material thought to be of value.' Each of the libraries I have attempted to describe has excellent organizations for the use of their contents by research students in the many domains of economics. One striking evidence of their fruitfulness is the cart-load of excellent

treatises, pamphlets and periodicals of economic interest.

ECONOMIC LIBRARIES IN INDIA.

Now that I have given a rough sketch of the chief features of some of the best world's economic libraries (the information is culled from the various learned contributions to Palgrave's third volume of the Dictionary of Political Economy), let me say a few words on the economic libraries in India. In the first place I do not know if in this extensive land of ours there are any economic libraries worth the name except a few hundreds or tens of hundreds of volumes (text-books by standard and minor writers, a few periodicals of both Continental and Indian fame and a big unanalysed and ill-classified heap of government publications and commission reports all counted together) even in the University Libraries. A glance at the catalogue of our Madras University Library (both the original and the recent supplement) will show that not more than six or seven pages are devoted to the names of periodicals—not all of economic interest—those of economic interest can be counted on one's finger's ends. The number of standard works on Economics (General and Indian) has perhaps the same tale to tell. As for the other University Economic libraries, I frankly confess I have not seen them or heard much of any special interest about them. The economic libraries of some seven colleges affiliated to our Madras University I personally had the pleasure of seeing and they do not even approach the ideal of Europe and America either in the matter of the number of standard books and periodicals or in any outward signs of their having been used by any body except perhaps the lecturers and a few others in charge of the subject (though of course in a few cases I have to borrow a penknife and cut the still uncut pages). A government college in the south had not 'the Economic Journal' until very recently and the college from which I come began to import 'the Economic Journal' only

since last year. As for private libraries of Professors of Economics, about four years ago I had seen one of a Government College professor and the other of a Native State College professor. The library of the latter though it cannot of course stand comparison with that of a Professor Seligman of the Columbia University is by far the best of the private economic libraries in Southern India and I must acknowledge that myself and our humble College library, Economic section, at the Findlay College, Mannurgudi, have derived not a little inspiration and suggestion from it with regard to an average equipment of books for coaching our B. A. students for the University examinations. As for the big Madras University library and the other Metropolitan College economic libraries, I am given to understand—I am open to correction if my information is wrong—that very few people use the books and periodicals there and perhaps fewer people know how to make use of the valuable information stored in the few standard works, periodicals and government reports of economic and statistical importance. I shall be glad if the University Economics professor and his able staff would organize a series of special demonstration lectures as to a rational use of economic libraries not simply in the City of Madras to the fortunate few economic students here but even in some select localities in the mofusil.

II

ECONOMICS AND THE MADRAS UNIVERSITY.

Let us now examine in some detail the Madras University machinery for Economic studies and teaching. I purposely leave out of any special account here the recently instituted course of studies for Diploma in Economics; for it is too premature to think of improving it since it is an infant of two years. With regard to the courses of economic study prescribed for the Intermediate and B.A. (Pass and Honours) candidates

there is room for much improvement and fruitful reform; so also regarding the system of examinations now in vogue. Much has as yet to be done by way of finding suitable text-books adapted to the requirements of the recently issued Economics Syllabus for B.A. (Pass and Honours) courses. Even the syllabuses have to be reconsidered by way of deleting some headings there and adding others of an advanced character especially if provision for some form of economic principles, General and Indian, is insisted upon in the High School and Intermediate classes.

The economic research machinery and especially the staff (and duties) of the University Professor of Economics have to be enlarged for bringing about a better system of Economic studies and teaching. The system of University lectures has to be improved.

I am not, of course, so pessimistic as to hold any untenable view that the present system of our Madras University has been a thorough failure. I only hold that my suggestions if accepted and adopted by the University fathers, would better the system of economic teaching and studies in the various colleges affiliated to the Madras University.

My honest opinion is that though the actual number of annual passes in the Intermediate, B.A. (Pass and Honours) [Branch v] (Group iii) may not give us any very great alarm, the quality of the sort of knowledge in Economics (General and Indian) which an average successful candidate may possess is not at all encouraging and I think that such an unsatisfactory state of affairs is to more or less extent due to the cumulative force of such causes as the following :—

[I combine below a brief account of the causes and remedies (and methods) that I have to suggest.]

1. My first cause for the unsuccessful realization of sound economic studies in the college classes is that not even the elementary

principles of economics (General and Indian) are taught in the high school classes of this presidency. So far as this unfortunate subject of economics is concerned, there is a wide gap between the high school curricula of studies in what they call Group C of the Secondary School-leaving Certificate and Group iii of the Intermediate. The Madras University with Government aid, if necessary, should insist on the method recently adopted by the Mysore University in introducing simple Economics into the high school classes. Some such matter as is found in 'simple Economics for Indian schools, by J. R. Cornah, 'Longmans Green & Co.' must be imported to high school candidates either in Form iv alone or in Forms v and vi. I do not mean to accept Mr. Cornah's little book as the ideal book answering my suggestion, I have only mentioned it as indicating the scope roughly of my suggestion. [Penson's book or the new primer written by Prof. Chapman may be introduced as a high school Text-book of Economics. Some elementary notions of Indian Economics must either be correlated with general principles or small primers must be written for the purpose.] Some special insistence must be placed on Indian Economic Geography by making it a compulsory and examinable subject in Group A or C; for there is no use of having this useful subject in that all comprehensive but really hollow Group B.

2. The status of Economic History in Group iii Intermediate is very precarious; it has no independent status and hence students may safely neglect any study of the Economic History of England and yet secure a distinction mark in the University Examination. The object of the University is being defeated on account of scant attention being paid by the examiners to the industrial aspect of English History. Let it therefore be separated from Political History of England and given an independent status along with Economic History of India. Let

some detailed syllabus be drafted by the University on English and Indian Economic History. Want of text-book answering this suggestion may be put forth as relevant objection but the detailed syllabus if carefully drawn by the Board of Studies will induce many History lecturers to produce a crop of text-book literature. The syllabus if interspersed with items demanding correlation with English and Indian Geography in some particulars at least will furthermore be satisfactory. There need not be any fear of overburdening the student on account of this suggestion especially if the ambitious course of the Political History of England is correspondingly lightened. The interests of Political History of England will in no way suffer since most of the detailed information there is being at present overtaught on account of the ambitious requirements of the examiners. Also special attention may be drawn to brief outlines of Economic thought in Classic Antiquity in connection with the Ancient History of Greece and Rome by the University drafting, if necessary, a syllabus for the guidance of lectures in Grecian and Roman History.

3. The B.A. (Pass and Honours) course of Economics as at present constituted is not altogether satisfactory. The University fathers or perhaps the Board of Studies, to be more accurate, have drafted recently some syllabus; thus far they deserve special thanks; for they thereby remedied a most anomalous state of circumstances. Until recently, the Political Economy syllabus of the sixties or seventies of the last century was the official guidance for the University examiners whose outlook of the scope of General and Indian Economics was sometimes as narrow as narrowness can ever be, and at other times as vast as vastness can ever be. University questions on the Madras B. A. Economics between 1890 and 1911 were often symbols of the personal whims and caprices of the University examiners who seem to have been guided sometimes by some unimportant

paras in tattered volumes of their student days, chance statements in current periodicals, or over ambitious requirements in especially the Mechanism of Exchange and Public Finance. Until very recently questions of Economic History of England and India used to appear, questions for which the students used to be quite unprepared, for neither the teachers nor the taught, especially in the moffusil, had any idea of the colouring which the economics paper would have until somehow the name of that particular year's examiner was rumoured about. If my information is well founded, X's notes were repeated a thousand times when Mr. X was the examiner; Y's notes when Mr. Y's turn came. The publishers of Z's book on some aspect of Economics were wont to be fattened with profits when Z's turn as an examiner came. 'Hints-hunting in Madras, at the time of the examination was until very recently a source of special profit to the hotel-keepers in Madras, for almost all the students of the Presidency used to flock to Madras in former years, and a premium used to be put on this hints-mania especially for Economics. I have thus far indulged in a diversion only to thank the recent syllabus makers in Economics who have given some certainty as to the scope of the course to be read by B.A. students. But is this an ideal syllabus? Does it satisfy the ideals to be realized? I have here again halting answers to give. For more reasons than can be compressed in the limited space which I wish to occupy, the recent Economics syllabus has, I maintain, to be reconsidered.

Indian Economics and its scope are not definitely depicted in the syllabus except in the vague direction in italics and in a few headings in the body of the syllabus. To the teacher of economics in the affiliated colleges of the Madras University it may have plain meaning, but to the examiners—I understand that they are not always graduates or professors of this University—they

may often seem either too narrow or too wide; and the papers they set had, I think, to undergo some further filtration before they can be finally accepted by the concerned board. Again the syllabus is (as syllabuses generally are of course) a patch-work of headings from several books small and big, though some very intelligent items as Family Budgets, Village and City Surveys, Salaries, Horizontal and Vertical Combination are given due prominence. Except in a few headings, no conscious attempt seems to have been made for keeping up any graduated line of thought in the drafting of the Pass and Honours syllabuses. The University questions are sometimes far below the standard expected of the syllabus, some-times high above the margin.

With regard to the B.A. (Pass and Honours course), I think it would be better if separate papers, one on General Economics Theory and the other on Indian Economics are set by the University and suitable syllabuses framed accordingly. I don't deny the interconnection between the two, but still the suggested method would, I think, better advance Economic studies.

Again due margin being allowed for the students being encouraged to consult a good many books as a supplement to the professors' lectures on the subject, I think the University will do well if it takes early measures to have suitable text-books produced, text-books written according to the syllabus. The syllabus drafters may be specially deputed to write text-books answering to their miscellany of economic topics called 'the economics syllabus.' Then I think they themselves would feel difficulties and learn to draft a better workable syllabus.

As I already remarked, the method of examinations must be thoroughly reformed. More insistence must be placed on the research and critical tendencies of students. Let me give a practical example of what I mean: especially on portions dealing with Currency and Exchange, let rows of statis-

tics be placed before the candidates and let them be asked to illustrate particular principles or let given statements be required to be elucidated in their light. Let special stress be laid on—say—diagrammatic representation of select laws and principles and economic chains of reasoning. Perhaps an over-emphasis on diagrams would not be so very valuable as faddists maintain. Some textbook writers can be understood plainer if their diagrams are ignored. I cannot understand the wilful omission of items dealing with Public Finance, in the syllabus headed 'The share of the state: Taxation.' There is undeniably much meaning in the insistence on the idea of the state as a sharer in the national dividend, though it must be said there has of late been controversy as to whether Taxation is to be discussed under the consumption aspect of economics or the distribution aspect. The new doctrine of the inter-relations really subsisting: between the various aspects of economics need not perhaps trouble us regarding this question. But why should the tail 'Protection and Free-trade' be dragged here from its natural place in the Mechanism of Exchange? There would have been some special sense if any better provision is made for public finance and then the item 'Free-trade and Protection' is there inserted.

Again, 'the Psychological basis of Economics' heading in the syllabus is mischievous; it belongs to the domain of controversy. The fallacies of the so-called Psychological school of Economics are, I think, due to their failure to understand the scope of Psychology as at present understood. The syllabus makers ought to have been clearer here or discreetly silent. They did neither.

Again, their analysis of the Factors of Production is not of a piece with their improved conception of the sharers in the distribution of wealth.

Further the items in the major heading 'Characteristics of Modern Production' form a curious medley, much more so if

italics are given the due importance they deserve.

Besides, no great purpose can have been served by taking a consideration of the Laws of Returns to 'the stages of Production.' Is the teacher to revise these ideas here or neglect even to refer to these laws in previous portions? Again, 'fiduciary money and substitutes' ought to have been more happily worded.

Perhaps the intentions of the syllabus makers would have been clearer had they appended a list of books to be consulted by the students. I am afraid this significant omission explains much regarding the real scope of the syllabus. There is really much more that can be said about the recent syllabus but I content myself at present with these brief observations.

4. Perhaps if an expert committee is formed out of the Board of Studies and actual teachers in the field, they may see how to produce a readable text from the lecture notes of all the teachers of economics in our Presidency.

The want of definite text-books answering to the syllabuses (though it might sometimes be discredited by some as more a high school or a middle school requirement) is one of the many causes for an unsatisfactory state of economic studies in our presidency. As Mahadeo Govind Ranade would have observed, the constant use of western manuals of Economic theory by our students has dulled their proper sense of the Economic postulates and assumptions as applied to India. The teacher of Economics again has, in the absence of suitable economic literature produced for Indian undergraduates, often to strain his ingenuity for suggesting parallels and illustrations to explain the western theory of Economics. I am doubtful if the Indian teacher of economics nursed and fed on Western books would always perform a successful feat in giving Indian illustrations. I know several European teachers of Economics, specialists excepted, would find it equally difficult to view Indian problems of economics with Indian specta-

cles. Some of these difficulties would disappear if, instead of private effort, university effort is directed towards the production of special text-books on Economics for Indian universities. Let not Professors' class notes be printed and called text-books. Almost every college lecturer in Economics has, I think, such a text-book. Books in several volumes, two or three like those of a Nicholson or a Taussig or Bastable have to be written with special reference to Indian conditions and in a way adapted to meet the real needs of the Indian Universities. I think the University may depute a Committee of experts having much leisure and freedom from other worry to do this useful work. This is perhaps the grievance as I elsewhere remarked of all the Indian Universities.

5. The economic research machinery of our University has to be set in more brisk motion if the economic studies and teaching are to improve. Probably a little more of carefulness in the supervision of our University might lead to this machinery being a medium for the production of fruitful and useful literature on Economics general and Indian. The dissertations and researches of University studentships, University Professors are all to be collected and bound into volumes to be placed at the disposal of every affiliated institution. A part of this research staff might more usefully be asked to be an itinerant body, at least for a fraction of the year going from college to college and making practical demonstrations by delivering lectures on the subjects or the select results of their research. University lectures are mostly monopolised by the metropolis and hence some such steps as those suggested have to be taken for meting out equal benefits to all affiliated colleges and students and other university alumni there. Financial difficulties may be urged perhaps for actualising some of the above suggestions. My only contention is that if the suggestions are found effective enough money must somehow be found and no stone should be left unturned to see that the interests of this practical science are advanced.

CONCLUSION.

I have made a few suggestions on this important subject and I feel amply rewarded if they are thought provoking amongst experts and lead to some definite and tangible and useful results.

SOME ASPECTS AND NEEDS OF OUR INDUSTRIES.

BY "MERCANTILIST."

WE are now at the beginning of a great period of industrial expansion. On many sides there may be seen in Mysore evidences of earnest endeavours to benefit by past experiences and to initiate a policy of reform and improvement in the economic conditions under which industries are being exploited. The commercial intelligence and the administrative abilities of the controlling agencies have already led to a considerable amount of industrial progress in Mysore and have also paved the way for greater expansion. Every attempt is being made to place our industries on sound economic basis and we can hope for our full return by efflux of time, improvement of methods and a greater yield from our raw materials. There has also been a considerable advancement in the education of our people not only in mere book learning but also industrially and they are thus becoming gradually but surely a more and more valuable asset to the State. While they are thus advancing, so is their mode of life improving, their wants are increasing, luxuries are rapidly being converted into necessities and their spending power is also increasing steadily. This advancement and increased standard of life everywhere have naturally resulted in an increase of consumption, but comparatively little advance has been made in the rate of production. There is, therefore, urgent need for an economic increase of our output, for the elimination of waste, both of labour and of material, for the improvement of old processes of manufacture and for the discovery of new. If progress is to be maintained every one of us must make our best contribution to this end by producing the most and the best of which we are capable. We want craftsmen who could put their best work into

their materials, but there are crafts which must work with materials of a low grade and it is important that the materials should not be despised but used to the best advantage. A number of industries are no doubt surrounded with a crowd of uncertainties and they need all the aid that science and a sound organization can contribute. There are many untrodden but yet lucrative paths of business and a large number of them are hampered by the need of capital. This need can be easily met if our rich men set aside their excess wealth for industrial progress. New enterprises are generally started by the savings of the well-to-do and by means of funds that are or should be available for speculation.

The one factor that is essential to our lasting prosperity is industry and it will only be by improved methods in industry and increased production that the lot of the individual worker will be improved. The fruits of our industries depend upon the extent to which we adopt our new methods of production and bring about co-operation between every class of worker (a) in the production of raw material, (b) its conversion into commodities of use and (c) its ultimate transport and distribution. We have to open and replenish granaries, fill our stores with goods available in price to the poorest of the State and when all this has been done, we must send our surplus products outside the State in exchange for raw materials and goods which we cannot produce ourselves. Manufacturers should get together, segregate their products into sizes and types and each agree upon making one or two lines of goods in quantity which their plant and works are best fitted to produce. It would be very useful to have an association or committee of manufacturers and production experts, of persons of knowledge and experience in commercial and industrial matters with representatives also of Government Departments to analyse the position of the Mysore manufacturers, eliminate useless varieties of

types and insist on economical production in every factory. It is also desirable to establish a Central Clearing House for all export orders received in this State from various quarters. All such orders would be sorted and placed with firms in such a way as to facilitate quantity production.

The development of export markets for our manufactured products is also a matter of vital importance. Every manufacturer should be posted with information of such a practical character as will enable him to take advantage of opportunities that present themselves in foreign markets.

There is also urgent need for the establishment of new methods of selling, packing and distribution for organizing selling agencies, for regulating prices and particularly in controlling and directing the great forces of finance and transport in order to secure control of the big markets. All these are questions which our manufacturers must take up for themselves.

It is generally believed that there exists widely distributed in Mysore or that Mysore is capable of producing, a vast amount of raw materials of great diversity of character. But in most cases our raw materials are exported and after exportation a large majority of them reappears later on in the form of finished products. For instance, we are producing large quantities of wool, but comparatively very few people in Mysore are benefitted thereby; for, with the exception of a certain quantity of the Mysore wool dealt with by the Bangalore Cotton, Woollen and Silk Mills, Ltd., the major portion of our output is sent out to other countries to be worked up into cloth and similar materials some of which come back to clothe the Mysorean. It is pleasant to note, however, that efforts are being made to remove this anomaly and it may be possible that in course of time a local woollen industry will be flourishing.

A considerable amount of very valuable work has already been done in regard to the

exploitation of several raw materials in the State, but there yet remain large areas of great potential importance which require to be carefully examined. Each year's work brings to light new resources and possibilities not hitherto discovered and every effort is being made to foster local production and use of raw materials and their products. It appears, however, very necessary and urgent that matters should be re-arranged in such a way that we shall receive great advantage from the raw materials. One of the most important questions which may, in this connection, be considered is the establishment of factories and works as near as possible to the sources of raw materials in various parts of the State. This would eliminate transference of commodities from one place to another or reduce the weight and bulk of the material to be transferred, the money and effort expended on the moving of material would be substantially saved and the producers and consumers would also receive a larger share of the results of their labours.

The elimination of waste in dealing with materials in our industries is also a matter which demands careful attention. It is of the utmost importance that our materials should be so dealt with in processes of extraction, manufacture, etc., as to fetch the maximum amount of benefit. Any waste which is made in any industry would not only lead to an increase of the cost of the manufactured products but also reduce the profits of the concern. In the case of certain materials which are to be looked upon as only a fixed asset and are not capable of expansion by improved methods of working in the same manner as agricultural products, the need for preventing waste is more obvious. For, if once they are dissipated they are gone for ever. Taking for example, the minerals of Mysore, it is very important that they should be mined in the most efficient manner to ensure that their winning entails no unnecessary cost to the lessee and to ensure that the methods employed are such

that the mineral remaining in the ground shall not be lessened in value nor made more difficult to win. After that the products of the mines should be so used in processes of manufacture as to fetch the maximum amount of benefit. A lessee who merely mines the minerals and exports them is no wiser than a man living on his capital, which in an individual is generally understood to be a thriftless proceeding, and although this consumption of capital is inevitable if the minerals are mined, it is of the very first importance that the country should get out of the minerals all the economic benefits that can be obtained. Until recently several of our minerals were being squandered by ores being exported instead of being reduced in this country and the resulting metals either exported or employed in manufactures within our borders. One of the most flagrant examples is that of manganese and chrome, several thousands of tons of these ores being sent out of Mysore every year and none used here in the production of metals.

This phase has been slowly passing and of late the Government are not permitting certain minerals to leave the Mysore State in the shape of raw materials which can with profit be manufactured here and a more valuable product obtained for export or home consumption.

Some of the most important matters which require immediate attention in connection with the progress and expansion of our industries are:—

- (1) The investigation of important raw materials chief new or little known;
- (2) The question of the steps to be taken, where desirable, to bring the information collected to the notice of our merchants and manufacturers, through the Mysore Chamber of Commerce or other suitable medium;

- (3) Arrangements to suggest sources of supply of raw materials required by our manufacturers;
- (4) Arrangements to promote local trade and industry, especially in raw materials, by more extended technical research, commercial investigation and communication with merchants and manufacturers;
- (5) The provision of more extensive laboratories and workshops with necessary staff for investigation and research into the composition and uses of raw materials of all kinds;
- (6) The collection and arrangement of information relating to the raw materials of the State in all their aspects;
- (7) Arrangements to find commercial outlets for raw materials and to publish the results of the investigations in regard to the occurrence, quality, uses and value of the raw materials.

One of the greatest obstacles in the way of industrial progress has been the tendency of the majority of our manufacturers to hide their works, processes and operations. This has prevented them from sharing their knowledge for the common benefit of the industries and for the better combating of foreign competition. It is important, therefore, that the manufacturers should lift the veil of secrecy and that rival manufacturers should turn to each other for mutual guidance and assistance. A very considerable interchange of knowledge and experience could then be effected to the benefit of all concerned. We need, therefore, a centralized scheme which will effectively provide for that interchange of thought and knowledge between the several workers without which the full benefit of their knowledge and discoveries cannot be secured.

MYSORE AGRICULTURAL AND INDUSTRIAL STATISTICS.*

The statistics and review have, as usual, been received after considerable delay; nor has the delay led to any greater accuracy in the figures. In fact, the figures of the Bangalore District are in some cases identical with those of 1917-18.

VILLAGE ACTIVITIES.

The statistics cover 185 villages more than in the previous year, being for 18,923 against 18,738 villages in 1917-18. The number of Village Committees administering these villages has decreased from 10,929 to 10,524. There are also similar decreases of varying degrees, in the number of committees that did real work, quantity of village improvement work turned out, the value of religious and charitable works executed by private parties, the number of villages where weekly meetings were held for purposes of education and of those where communal labour was rendered for half a day in the week. The regularity with which communal labour was rendered shows also considerable decline. The general reason given for these decreases is the prevalence of influenza and the economic strain on the population consequent on scarcity of food stuffs and rise of prices.

POPULATION STATISTICS.

The population of these villages numbered 47,71,549 against 49,07,650 in 1917-18, the decrease of 2 lakhs being mainly due to the ravages of influenza. Some considerable discrepancy in numbers is noticeable between the decreases in the different sex and age groups indicated by these figures and those indicated by the statistics of influenza mortality supplied by the Sanitary Commissioner.

The relative variations, however do not differ and the total decrease as evidenced by these figures is about the same, i.e., 2 lakhs, as that disclosed in the other set of figures. On examining the incidence of mortality by occupations, it is found that it was heaviest among agriculturists. The decrease in the total population depending on agriculture as given in these statistics, almost equals the decrease in the total population, the decrease in some of the other occupations being set off by increases in others. The only conclusion open from these figures is that the decrease under agricultural population is occasioned, not merely by influenza mortality but also by transfers of agricultural population to other occupations to some considerable extent. For example, the decrease under labour is only 4,000 for a population of 4,26,000 and the number under "other occupations" gives an increase of 14,000 in a population of 2,40,000. Both these groups doubtless suffered to an appreciable extent from the prevalence of influenza and the absence of substantial decreases in them shows that their ranks have received appreciable additions from agriculture. Such transfer is most noticeable in Kolar and only slightly less so in Tumkur. It is noticeable in the districts of Mysore and Chitaldrug also. The circumstances that led to the transfer of agricultural population to the other occupations as well as the exact nature of the so called "other occupations" deserve careful study by local officers. It is well to remark in this connection that the group "other occupations" includes mendicants also and it would be a matter of no small concern if it should turn out that the transfers from agriculture have really been to that class. These statistics give also a general impression of higher mortality among dependents than among actual workers, except in the case of agriculture where the male workers show the heaviest percentage of mortality.

* Mysore Government order No. 912-35-Spl. 21-19-2 dated 8th March 1920, recording letter from Rev. Commissioner in Mysore dated 27th January 1920, submitting a consolidated return of village statistics in Mysore with his review thereon for the year 1918-19.

EDUCATION.

Coming now to the statistics relating to education, it is found that the increase by 145 in the number of schools (8040 against 7,895) was very slight indeed and that the number of Government schools at the end of the year was actually less than that in the beginning in Mysore, Shimoga and Chitaldrug Districts. In view of the fact that hardly 2,19,414 pupils or 4.5 per cent of the total population are receiving instruction and that only 2,67,448 persons or 5.6 per cent of the total population dealt with in this return are literate, it is not a matter that Government can contemplate with equanimity, that the activity to keep up a steady, though slow increase in the number of institutions should have abated. Government note also that the actual number at school was 6,000 less at the end of the year than at the commencement and that the largest deficiency was under boys, being 3,880. The argument that influenza is responsible for this decrease cannot be accepted, as the figures relate to the strength of schools in April or in June 1919, *i.e.*, over 4 months after the abatement of the influenza epidemic. The decreases were largest in Mysore being 2,000 under boys and 800 under girls, while there was a decrease of 1,800 under adults in Tumkur District. It is possible that the decrease under adults in Tumkur is only apparent and is actually due to an inflated figure having been given in the previous year, but the decrease in the Mysore District is disconcerting. The total number of reading rooms and similar institutions at the end of the year is found to be 1,709 as against 1,671 in 1917-18, there being a large decrease of 126 in Tumkur and of 93 in Mysore. Comparing, however, these figures with the figures of 1914-15, it is found that in spite of the temporary decrease consequent on the exceptional features of the year, the advance over the previous equinquennium has been maintained. The total number under instruction

showed an increase of 35,003 or 25 per cent under boys, 10,000 or 50 per cent under girls and 12,000 or 250 per cent under adults.

AGRICULTURAL PRODUCTION.

In statistics of agricultural production, the bad seasons and the high prices are both found reflected. Though there was a shrinkage under area cultivated (59,71,422) acres against 63,19,014 for last year) the value of outturn (Rs. 10,80,74,515 against Rs. 10,59,29,376 for 1917-18) was higher than that of the previous year by 20 lakhs owing to the high prices. It is not possible, however, to accept these figures as wholly accurate, the figures in several cases, particularly in the Bangalore District bearing evidence of inaccuracy, *e.g.*, the value of ragi produced in the Bangalore District during 1918-19 is given as 1,18,00,000 against the value of 83 lakhs in the previous year. Similarly the value of the output under horse-gram and other pulses is given at 21 lakhs against 5 lakhs in the previous year. Allowing both for increased production as the result of the special food production campaign conducted by the Agricultural Department in regard to summer crops last year, and also for high prices, it is difficult to accept these figures without a guarantee of reasonable accuracy from the local officers and this is not forthcoming.

Under Mulberry (37,740 acres against 28,311), an increase of 110 per cent is shown in the value of outturn of the whole State, Bangalore alone claiming an increase in value to the extent of Rs. 5,40,000 over the previous year's figure of Rs. 1,80,000 over the previous year's figure of Rs. 1,80,000 and Mysore claiming an increase of Rs. 6,50,000 over the previous year's figure of Rs. 4,90,000. These figures again have been submitted without special comment and guarantee. The Deputy Commissioners and the Superintendent of Sericulture are requested to get these figures verified and to issue

instructions for the correct recording of values in future years.

AGRICULTURAL STOCK.

The general trend of statistics of agricultural stock is not encouraging. Though the apparent decrease of 2 millions under live-stock (72,12,530 against 92,08,552) is due to an error to that extent in the figure for Shimoga given for 1917-18, there is still evidence of appreciable loss under this head. There was a substantial decrease of 21,220 in the number of ordinary ploughs and there was no increase worth mentioning in the number of improved ploughs in use. The decrease in irrigation wells even in a year of comparative drought is evidence of the lack of resourcefulness in the raiyats at present. The number of pumping installations in use shows an apparent decrease of 80 from 189 in the previous year but a reference to the figures for 1916-17 discloses that the decrease is fictitious in as much as the figure for Shimoga given for the intermediate year (1917-18) was inflated to the extent of nearly 80.

INDUSTRIAL OUTPUT.

The outstanding feature of the industrial statistics is the large decrease in the quantity of output under weaving, though the value of even this decreased output is higher than that of the output of 1917-18 being Rs. 51,56,799 against Rs. 50,12,659. It is obvious, however, that there could have been no increase in the real wages of the weavers. The figures under sericulture are again misleading, the unit of quantity adopted in Kolar District being obviously different (and comparatively minute) from those adopted in the other districts. The value of output under this head shows some increase due to high prices.

The sudden decrease from 1,954 in the previous year to 799 in the number of *charkees* in use requires also explanation.

Comparing the incomes of several occupations, it is seen that weaving still retains the first place, yielding an income of Rs. 41'5

per head of population depending upon it. Silkworm rearing comes next with Rs. 34'2 per head. Agriculture including under this head the rural labourer as well, who mainly depends on agriculture yielded Rs. 25'5. The potter comes last with Rs. 18'3 per head. Taking non agriculturists, all told, their average income is found to be Rs. 9'5 which is obviously due to the unproductive nature of the so called "other occupations" comprising 2'5 lakhs of people, against 2.9 lakhs of people in specified occupations.

There are still over 8 million acres of assessed land available for cultivation and liberal rules exist also for the grant or *shraya* tenures and of takavi loans in deserving cases. With such facilities and with 6'5 land nor specified occupations, the Revenue Officers whose duties in four districts have been considerably lightened by the separation of Judicial and Executive functions have ample scope for useful activity in the direction of settling this population gradually on the land.

ECONOMIC CONDITION.

The figures given under the heading "Economic conditions and agencies for improvement" tell also a similar tale of lack of progress. The number of agricultural families having subsidiary occupations has decreased by 4,000 (72,720 against 76,951) and that of families which can sustain themselves in successive years of scarcity has fallen by 7,700 (51,243 against 58,996). The other unfavourable features have already been referred to in paragraph 3 of the review. The percentage of the members of Co-operative Societies to the total number of possible members (heads or families) is very low being only 4'6 percent. The number of villages having some communal institution or other is still inconsiderable. A review of these figures therefore only impresses upon Government the need for greater vigilance and activity in the cause of rural amelioration and they desire to call upon all their local officers to make sustained efforts in this behalf.

Government are aware that the conditions during the year were exceptional. Substantial progress stands to the credit of the local officers as the following table prepared for the quinquennium (1914-15 to 1918-19) will show:—

STATE AVERAGE.

1914-15.

- One school for every 847 persons.
- Twenty-nine pupils in each school.
- Literacy—4·9 per cent of the population.
- Percentage of pupils under instruction to total population 3·4 per cent.
- Average income per agriculturist Rs. 21.
- Average income per head of population Rs. 20.
- One Co-operative Society for every 27 villages.
- One Reading Room for every 8,231 persons.
- One Improved plough for every 465 ordinary ploughs.
- Seventy-one pumping stations or 8·8 per one district.

1918-19.

- One school for every 593 persons.
- Twenty-nine pupils in each school.
- Literacy—5·6 per cent of the population.
- Percentage of pupils under instruction to total population 4·5 per cent.
- Average income per agriculturist Rs. 25·5.
- Average income per head of population Rs. 23.
- One Co-operative Society for every 22 villages.
- One Reading Room for every 2,792 persons.
- One Improved plough for every 217 ordinary ploughs.
- One hundred and nine pumping stations or 13·6 per district.

BHATKAL HARBOUR SCHEMES.

FROM time to time this *Journal* has had the pleasure of bringing before the public informative accounts regarding the port of Bhatkal on the West Coast of India (Lat. 13°—58' N) to which the Government of Mysore desires access. The Railway and Harbour Survey operations which were commenced in 1915 by Mr. R. N. Mirza have now been completed. In our previous issues, we have described the possible Railway Route to the Sea Coast from Shimoga, but to refresh the memory of the readers, we may once more mention that the Railway alignment commences from Shimoga and passes through Haranhally, Arasalu or Benvalli, Anantapur, Sagar, Talguppe Mailmanjai (the ghaut head) Chandemani, Jonad (Vide the Map of South—West Coast of India recently supplied to the readers of this *Journal*,) Badaibag at the feet of the ghaut). The malnad and ghaut country at present has an extremely poor population and the necessity of a Railway is great, to help and open up this fertile, but deserted piece of undulating country. We reproduce below a brief but effective description of the ghaut regions from a paper recently read by Mr. R. N. Mirza, Executive Engineer A.M.I.C.E., B.E. (Lvpl). M.I.M.E., before the Mysore Association of Engineers:—

“When in December 1915, I first reached the forlorn villages of Kogar and Mailmangai, and walked down the Public Works Department road (which is nearing completion) leading into Bhimeswar Valley, and realised the magnitude of the survey task before us, I must admit that my sensations were unusual. I was deeply impressed with the difficulties it entailed.

I could not help realising the steep and offensive slopes of the mountains, the intense density and abundance of a life so distinct

from ours, the air of mystery, grandeur and aloofness emanating from the mighty forests, as they lay shimmering in the noon-day heat. The air was moist and warm and as far as my eyes could see it was nothing but an endless and an unsympathetic pageant of jungle life. But, strange as it may seem, here and there, hidden away in these forests one *does* come across relics of human life existing in say, a couple of huts, which generally by the irony of fate, are labelled on maps as villages. Nothing but the entry of a Railway always "so matter of fact" and friendly—will break the overpowering influence of the jungles."

We may add that the Railway line from Shimoga to Arasalu (27 miles) is now under construction. The Arasalu-Sagar Section Report & Estimate have been completed and are, we hear, under consideration.

From an Engineering point of view Bhatkal harbour has been thoroughly studied and reported upon by several Engineers, Sir Francis Spring, Sir Frederick Sprott and Mr. Fosberry, and lastly by the firm of Sir John Wolfe Barry, Lister and Partners (London), whose representative Colonel Ducane, R. E. visited India recently. Colonel Ducane (accompanied by Mr. Mirza) went to Bhatkal at the end of June last year. As they had the unique opportunity of travelling from Mangalore to Bhatkal (90 miles by road) in continuous pouring rain, we hope that the gallant Colonel had unique opportunities of studying monsoon effects on the West Coast. Col. Ducane stopped at Bhatkal several days and studied the monsoon and geological conditions pertaining to the locality thoroughly.

We summarise below the results of various reports:—

- (1) In 1916, Sir Francis recommended an outer harbour where vessels lying at moorings can load their cargoes between ship and shore by means of 40 to 100 ton lighters,

the cost would range between 165 and 175 lakhs. It may be noted that in this case this would necessitate a double handling of goods into lighters, whereby the cost of working the cargoes would naturally increase and further in rough weather, it may be found impracticable to work the cargoes.

- (2) In 1917, Sir F. L. Sprott and Mr. Fosberry reported on a scheme for making a small basin of about $2\frac{1}{2}$ acres, which would be protected on the south side by the beneficial position of the Beacon Hill (152' high) and on the north side by the long trailing flat topped bluff 160 feet high. [Reference is invited to the map of South-West Coast of India supplied with No. II Vol. IV November 1918 issue of this *Journal*, in which all these details are given]. This area of $2\frac{1}{2}$ acres could be increased to 24 acres eventually. The cost of the complete scheme would be about 107 lakhs. The entrance to the basin would be protected by two breakwaters enclosing about 18 acres of water. [A good idea of these conditions can be gained by studying the frontispiece to this *Journal* No. 7 Vol. III of July 1917 which practically represents the scheme.]
- (3) Mr. H. D. Rice, who as the Superintending Engineer, Mysore Railway Service, had been looking after all the survey investigations, submitted In 1918, a very ingenious proposal for constructing an inner harbour situated in the river creek (east of the Lighthouse Hill) which could be entered from the open sea through a great cutting right across the shorter axis of the oval shaped Lighthouse Hill, the entrance to the cut out channel being of course protected by breakwaters. This cut would

have a maximum depth of 170 feet and a clear bottom width of at least 150 feet. This is undoubtedly a bold scheme and one of the reasons which prompted this idea is as follows:—

On the western side of this ellipse or oval shaped lighthouse hill, there is a locality, where the surrounding sea waters are deepest (thus entailing minimum amount of rock excavation during construction) and so the idea is to obtain a passage from the deep water locality to the inner basin, and this was to be achieved by making a deep cut right across the hill. Mr. Rice estimated the scheme to cost Rs. 58 lakhs with short breakwaters. The cost of this harbour construction including breakwaters extending to about 5 fathom line (*i.e.*, where sea waters would be 30 feet deep) and enclosing 55 acres of water would run up to Rs. 120 lakhs.

- (4) Further below, we reproduce from the *Times Engineering Supplement* an account of schemes suggested by Mr. Anthony G. Lister of Sir John Wolfe Lister and Partners.

It appears to us, that in the two alternative schemes proposed by Mr. Lister, two points affecting the safety of a harbour are most carefully considered which are as follows:—

Wind and its direction and hence the location of breakwaters.—By studying the wind charts prepared by the Government of India, we would find, that as a general rule, the wind in June (when the Monsoon breaks on the West Coast) blows from between West South West and due West.

From July to August the winds slowly veer toward North and in September, October and November the tendency appears to be steadily towards the North.

Breakwater Enclosure.—We are given to understand that it is very important to arrive at the necessary area of water to be enclosed by two breakwaters in order to completely absorb the wave action coming in between the entrance, so that in stormy weather, it would not be dangerous for vessels seeking a passage into the sheltered waters from the open sea where the waters may be in great turmoil. In Mr. Lister's scheme, the breakwaters will enclose 110 acres and the entrance will be 450 feet wide, widening out to 3400 feet.

TIMES ARTICLE No. I.

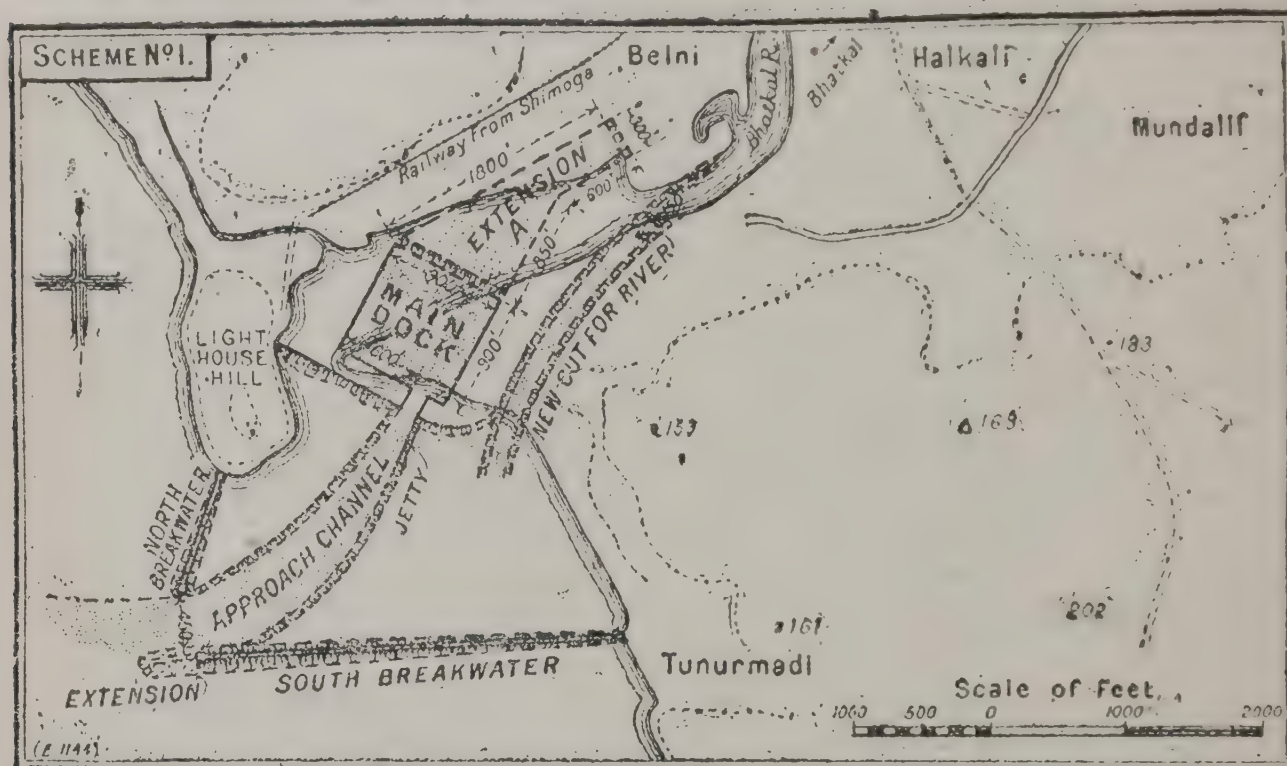
The following is the first article which appeared in the *Times Engineering Supplement* for December 1919, under the head of "Projected Western India Harbour":—

From many points of view, and not least that of the engineer, great interest attaches to the scheme put forward by the Government of Mysore for an outlet to the sea by a harbour at Bhatkal, a few miles from the western frontier of the State and near the southernmost point of the Bombay Presidency.

In the absence of railway communication, few parts of India are so little known as that which the Mysore Durbar hopes to develop. The Bombay district of North Kanara is divided into two parts by the Western Ghats, and the lowlands which meet the sea comprise beautiful forests, numerous lagoons winding inland, and hamlets with rice clearings. The country is seldom visited, except by officials or sportsmen. Bhatkal is near the mouth of a small stream

which falls into the Arabian Sea. It has a population of only some 7,000, but if modern engineering science gives promise of a great future, it can claim a prosperous past.

From the 14th to the 16th century it was a flourishing port, where ships from Ormuz and Goa loaded sugar and rice. In 1505 the Portuguese established a factory there, but



their subsequent capture of Goa deprived the place of its importance. Two attempts made by the British in the 17th century to establish an agency at Bhatkal failed, and the trade since carried on by small coasting boats has been negligible.

The nearest railway terminus is at Shimoga, in the Mysore State, 111 miles distant. More than half the distance will be covered by an extension to Talguppe, which is now under construction. Thence to the top of the Western Ghats, 83 miles from Shimoga, the line is undulating. The left side of the Bhimeshwar Valley has been provisionally selected for the descent of the Ghats, where the ruling gradient will be 1 in 40. British territory begins just before the descent ends, and the length of the line in the Bombay district of North Kanara will be about 13 miles. The Durbar is building the railway to develop the hill country on the west, known as the Malnad, and whether the line is carried beyond the head

of the Ghats depends upon the success of the current negotiations for access to the sea.

ALTERNATIVE SCHEMES.

The preliminary investigations of the possibilities of modern port development at Bhatkal were conducted with the assistance of two of the best known experts in India, Sir Francis Spring, then chairman of the Madras Port Trust, and Sir Frederick Sprott, chairman of the Bombay Port Trust. Two alternative schemes were put forward. The less costly of them, to which the State has been inclined, is governed by the consideration that where the water is deepest and there is least rock at sea, the approach to the creek—in which the inner harbour has to be located—is blocked by the hill on which the lighthouse is situated. The proposal is to cut through the centre of this hill to effect an entrance to the basin. The approach channel to the hill cutting would be protected by a break-water. The inner

harbour would be 16 acres in area and 30 ft. deep at low water, with quayage for nine large ocean-going vessels. The more ambitious project is for an outer enclosure by breakwaters of 13 acres to the north of Lighthouse Hill; an entrance therefrom to an inner basin of $2\frac{1}{4}$ acres to accommodate four ocean-going steamers; and a subsequent enlargement of the basin in the creek to accommodate in all nine such steamers.

There has been considerable agreement among the investigators as to the feasibility of harbour works, provided Mysore is prepared to spend about 100 lakhs of rupees. Detailed plans and estimates involving such expenditure are under preparation by Sir John Wolfe Barry, Lister and Partners, in the light of a report submitted to them by Colonel Ducane, R.E., who investigated the possibilities at Bhatkal during the monsoon season of last summer. The Mysore Durbar, after careful investigation are convinced that the trade developments resulting from the railway and the harbour would justify the expenditure. The trade of the Malnad and the adjoining British districts, it is argued, is heavily handicapped by merchandise having to travel 400 to 600 miles by rail before finding an outlet on the west coast. The export and import traffic by rail via Harihar, on the northern borders of the State, amounts to over 120,000 tons per annum, and there is a large amount of traffic between Mysore and the coast now passing over the Ghāt roads. It is believed that a considerable portion of the former and almost the whole of the latter can be diverted to Bhatkal. Important industrial undertakings, such as the smelting of iron ore and the manufacture of paper pulp are being started in the Malnad districts. Large hydro-electric developments, for which the Ghāt country is so exceptionally suited, are under consideration.

JURISDICTION.

The need for more harbours along the vast seaboard of India is obvious, and any new

provision of this kind will tend to counteract the concentration of manufacturing enterprise at the congested existing great ports on which the Industrial Commission properly animadverted. In this particular case, however, whatever merits the scheme may possess are liable to be overlaid by the political questions which arise. The Bombay Government have expressed their willingness to permit Mysore to build a port at Bhatkal under certain conditions as to jurisdiction. Mysore does not consider those conditions are suitable, and urges that unless it is given undivided civil and criminal jurisdiction in the administration of the railway and the harbour, dual control will open the door to unlimited friction and a general hampering of commercial transactions.

Mysore asks for jurisdiction for an area of only three square miles of the Bombay Presidency. It is not urged that the jurisdiction over the coast or any portion of the adjoining territory beyond railway and harbour limits should be transferred. The Bombay Government, however, object to the grant of criminal and civil jurisdiction within the railway and harbour areas. They propose the establishment under statute of some administrative body which would be entrusted with the charge of the port and be invested with rights and privileges such as those enjoyed by the Bombay Port Trust. The Durbar would work through the agency of this body, and civil, criminal and marine jurisdiction would remain with the British Government.

This view has been upheld by the Government of India, and the Mysore Durbar are now appealing to the Secretary of State in Council on the subject. The issue involves important principles connected with the relationship of the Indian States with the Paramount Power; but whatever view may be taken of this question of jurisdiction it seems desirable that Mysore should obtain an outlet on the Arabian Sea near which its frontier runs.

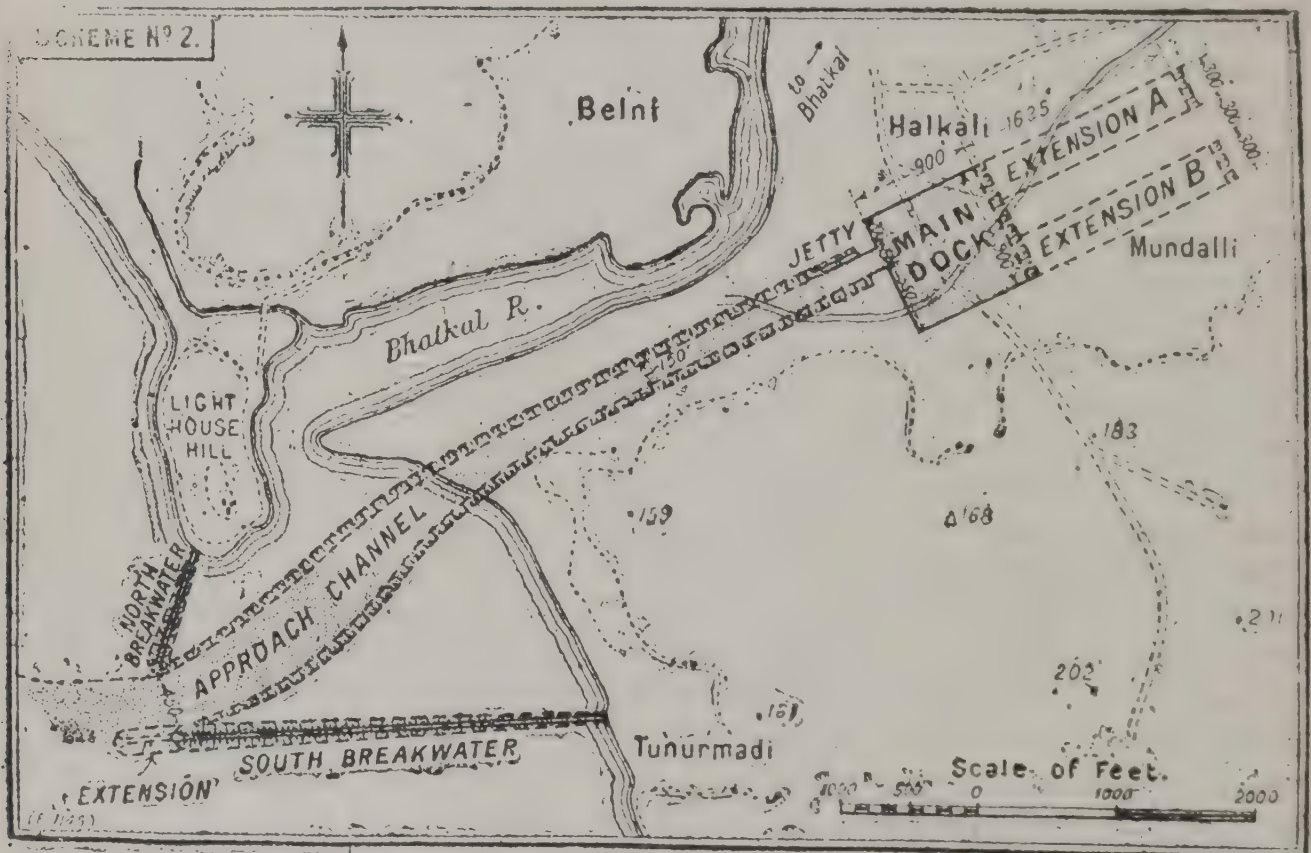
TIMES ARTICLE No. 2.

The following is the second article which appeared in the *Times* under the head "Alternative Schemes":---

An account was given in the last issue of the *Engineering Supplement* of the main features of the project of the Mysore Government to gain commercial access to the Arabian Sea by means of a harbour at Bhatkal, near the point on the western coast of India where the Bombay and Madras Presidencies meet, and 13 miles from the Mysore boundary.

Mr. Anthony G. Lister, of Sir John Wolfe Barry, Lyster, and Partners, has now reported to the Mysore Government on the project on the basis of the investigations conducted on the spot last summer by Colonel DuCane, R. E. He rejects the existing schemes and makes two alternative proposals for an inner harbour the entry to which would be protected by both a north and south breakwater.

Mr. Lister considers that an outside harbour would be unsatisfactory, because it would necessitate a double handling of all goods into lighters, whereby the cost of working the cargoes would be greatly in-



creased, while in rough weather it might be impracticable to work the cargoes at all. Of the projects for an inner harbour, the one hitherto favoured is that of Mr. H. D. Rice for a harbour to the eastward of Lighthouse Hill and ended by a cutting through the hill, the entrance being sheltered on the south side by a breakwater. Mr. Lister states that between June and October there are long periods when vessels would be unable

to make the entrance with safety unless more protection was afforded than that provided under the scheme. To make it practicable the breakwater must be carried out to the five-fathom line, so as to provide sheltered water for vessels entering the dock by breaking up the waves before they reach the entrance to the cutting. A better approach could be dredged more to the south, where a much larger area could be enclosed

ween Lighthouse Hill and Nelakundi Bluff for a much smaller expenditure on the breakwaters than would be necessary in the case of the hill cutting.

MR. LISTER'S PLANS.

Mr. Lyster submits two alternative plans, the first of which shows the dock situated in the creek immediately to the outward of Lighthouse Hill while, on the second the dock is placed inland about halfway between Lighthouse Hill and the town of Bhatkal. The latter would be the more expensive, but the dock, presumably, would be more sheltered from the southerly monsoon than under the first scheme. Mr. Lister observes that if after further investigation it is found that the creek site is not too exposed for the efficient working of the dock it would no doubt be advisable to adopt the cheaper scheme.

The first consideration is to provide an approach from the sea which can be navigated in safety during the prevailing westerly monsoons as well as at all other seasons. In both plans the approach channel is entered from the open sea between two breakwaters with a clear waterway of 450 ft. between their ends. The southern breakwater starts a little to the northward of Nelakundi Bluff and extends sea-wards in a westerly direction for 3,250 ft. until it reaches the $4\frac{1}{2}$ fathom line. There, in the first instance, it would terminate; but eventually, when the entrance channel is deepened, it might be extended about 500 ft. farther out to the five fathom line. The northern breakwater extends in a south-west direction from the south end of Light house Hill for a distance of 1050 ft. The breakwaters will consist of rubble mounds laterite with large concrete blocks on the seaward slopes and with concrete superstructures extending to a height of 9ft. above high water or 16 ft. above low water of spring tides. They will enclose an area of about 110 acres, widening out from 450ft. at the entrance to about 3,400, ft. next the shore.

APPROACH CHANNEL.

The approach channel of the first scheme has a length of 2,500 ft. from the entrance between the breakwaters to the dock, and a width at the bottom of the dredging of 500 ft. just inside the breakwaters, diminishing to 150 ft. at the passage into the dock. The corresponding length of the channel on the alternative plan is 6,300 ft. the widths decreasing also from 500 ft. to 150 ft. In either case there must be an entrance jetty about 400 ft. long just outside the dock for vessels to await admission.

THE DOCK.

On both plans the dock basin to be constructed in the first instance is shown 900 ft. sq., or sufficient for a very large vessel to turn in when other vessels are berthed along side the quays. The water area of the basin will be $18\frac{1}{2}$ acres, and three of its sides, having an aggregate length of 2,550 ft. will be closed by solid quay walls of concrete with granite coping. The fourth or inner side will be formed with a pitched slope for the purpose of later extension. The quay walls afford berthing accommodation for five very large vessels or about nine vessels of ordinary size. The berths alongside the pitched slope will be allotted to the dredging plant and other vessels not requiring the use of the cranes, sheds, etc., on the quays.

The extension marked 'A' on plan I will add 17 acres of water and 3,250 ft. of quay-walls thus giving a total water area of $35\frac{1}{2}$ acres with 5,800 ft. of quay walls, capable of accommodating 12 very large vessels or about 200 of ordinary size. In addition there will be 300 ft. of pitched slope at the far end of the extension. Subsequently the extension could be carried still further to the eastward. In the case of the second plan there is practically unlimited space for expansions. The northern extension marked "A" thereon will add 11 acres of water and 3,250 ft. of quay-walls, thus giving a total area of $29\frac{1}{2}$ acres with 5,800 ft. of quay-walls and 900ft. of pitched slopes at the far end.

A second extension marked "B" might be constructed if required, bringing up the total water area to $40\frac{1}{2}$ acres and the quay-walls to 9,050 ft.

RIVER DIVERSION.

In the case of the first scheme it will be necessary to divert the lower portion of the Bhatkal river through a new cut about 2,700 ft. long, having a bottom width of 150 ft. and discharging into the undredged portion of the area enclosed by the break water about 700 ft. south east of the dock entrance. The diversion is necessary to enable the dock to be excavated in the dry and it will probably be best to maintain the new cut as the permanent outlet to the river. The present outlet will be closed by a dam forming part of the southern embankment enclosing the dock of scheme 1. This embankment will be 200 ft. wide so as to provide, sufficient quay space on the south side of the dock. The quay space between the eastern side and the new river cut will vary from 380 to 450 ft. There will be an available width of about 400 ft. between the other side of the quays would be practically unlimited.

In the case of scheme 2 there would be no necessity to divert the river which would have its outlet next Lighthouse Hill, as at present. The breakwaters the Dock, and the inland portion of the approach channel would be started together. The first works to be taken in hand under scheme 1 would be the diversion of the river and the building of the breakwaters outwards from the shore. In both cases, Mr. Lister estimates that the first instalment of the works, irrespective of extensions, could be completed and brought into use within about five years from the start. If the whole scheme were to be put in hand at the outset the works might be completed in about six years.

ESTIMATES OF COST.

Approximate estimates are given for both the schemes, based on present-day including provision for contingencies and engineering fees and expenses, but not for the cost of railways and sidings. The cost of the first instalment for scheme 1 is a little under a crore of rupees, and for the second scheme Rs. 118½ lakhs. The total for the completed

work is in round figures Rs. 144 lakhs for scheme 1 and Rs. 170 lakhs for scheme 2. It should be noted that the latter figure includes only the northern extension marked "A" on the plan, and not the southern extension, which would cost Rs. 23 lakhs. The details show that although the completed scheme in both cases would cost about 44 per cent, more than the first instalment of the works, the quaying of the completed dock would be about $2\frac{1}{4}$ times that of the first instalment, and the earning power would be increased in like proportion.*

H. H. The Maharaja's Visit to Bhatkal.

A Correspondent writes:—Since 1915, Bhatkal has had visits from Harbour Experts and Inspecting Officers. For the past four years, Bhatkal Bazaar has had the opportunity of periodically selling foodstuffs to the footsore Maistry (the lowest paid subordinate official on a survey party) sent from the heart of the hot and steamy, forest and ghaut regions, where overseers Messrs G. P. Naidu, M. Lakshman Rao, and Venkoba Rao, and their sub-overseers have toiled and sweated, but it was a *gala* day indeed when His Highness visited the harbour site on 28th February.

His Highness the Maharaja and Dewan-Saheb and party motored from Kallurkatte to Bhatkal (60 miles) *via* Nagodi, (the ghaut head), Kollur (bottom of ghaut) Baindur (on sea waste) on 28th and returned the same evening to Kallurkatte.

All along the road, the ovation accorded to His Highness was most touching and impressive. At Baindur and Bhatkal, magnificent *pandals* and *Shamiana* were erected.

His Highness the Maharaja went to the top of the bluff opposite Mavintarvai Beach, and from there was able to get a panoramic view of the River creek, the Beacon hill and various other features. After spending about two hours at Bhatkal, the party returned to Kullurkatte. All the members of the party were deeply interested in all that they saw. They were also able to get a good view of the valley and the mountains from which the Shimoga-Bhatkal Railway trace emerges to reach Bhatkal.

*We desire to acknowledge our indebtedness to the Editor of the *Madras Times* for placing at our disposal the blocks from which schemes I and II are here printed [Ed. M. E. J.]

INDUSTRIAL NOTES FROM THE UNITED STATES.

Interesting Experiments in Sterilization by Pressure.

Washington, D.C., U.S.A. Dec. 24, 1919.—

A leading American university has for a considerable time past conducted, in its laboratories, experiments in accomplishing sterilization by pressure. The results are most interesting, and are given in a bulletin on "The Effect of Pressure on Micro-organisms," together with the technique of high pressure experimenting in bacteriology. Summarized briefly, the results are as follows:

No living thing has been found that could not be destroyed by pressure. Most bacteria, including those responsible for typhoid, tuberculosis and diphtheria, are killed in three minutes by a pressure of 75,000 pounds per square inch. Less time is required at higher pressure and more time at lower pressures. There is a fairly definite relation between the time and pressure, and having determined the time necessary to kill an organism at a number of widely different pressures the intermediate time-pressure death-points may be interpolated with considerable accuracy.

Spores require much more severe conditions—higher pressures or much longer time under pressure. Spore-forming organisms in the vegetative stage are easily killed, and complete sterilization may be accomplished by repeated brief applications of 75,000 pounds per square inch.

The above applies to room temperatures. Working at somewhat higher temperatures it would be expected that lower temperatures would be effective, and this is true, but the explanation may not be as simple as it might at first appear to be, since the same is true of somewhat lower temperatures, the time-pressure death-point curves for 5 degrees C. and 40 degrees C. being practically the

same. In sterilizing culture media, etc., it has been customary to work at 40-45 degrees C., to apply a pressure of about 100,000 pounds at the close of the day's work and to find everything sterile and ready for work on the next morning.

Working at 4-6 degrees C., a pressure of 75,000 to 100,000 pounds per square inch must be released or any water in the compressed material will be converted into a mass of soft ice. On releasing a pressure of 200,000 pounds at room temperature water is frozen hard. Most other liquids contract on freezing, so freeze at higher temperatures when the pressure is applied. Comparatively low pressures were found to be sufficient to freeze many liquids and the use of high pressure in obtaining low temperatures is suggested. Solid chloroform melting at 70 degrees C. was easily prepared.

The high pressure equipment used was very simple and easy to construct. A high pressure cylinder may consist of a block of steel with a hole through it, the hole being closed at either end by steel plugs one of which is long enough to serve as a piston. The liquid to be compressed is completely encased in a lead (or other soft metal) packing which consists of a piece of lead tubing both ends of which are closed with lead lids. The pressure is applied to the packing and its contents. There are no leaks. The pressures obtainable are limited only by the strength of the cylinder and piston. Cylinders intended for very high pressures were built up of several concentric cylinders shrunk together and thoroughly stretched by applying higher pressures than were to be regularly used.

AUTOMOBILE GEAR CHANGING AS A FINE ART.

Have you ever envied the automobile driver who pulls away from the curb without the slightest clash of the car's gears? Who knows exactly when to shift the gear ever and who does it so quietly that it seems to you, sitting beside him, that his car hasn't

any gears at all? Of course, you have. But why envy him when you can do the same with your own car if you will only find out what happens in the transmissions under the floor boards?

The design of the transmission and clutch has much to do with successful gear shifting, but however perfect the mechanism may be a certain amount of practice is necessary to shift the gears without the ends of the gear teeth striking together. It is this clashing of teeth that makes the grinding noise that makes your repair man welcome you so cordially when you pull up for oil or gasoline. He knows that, as a result, sooner or later you will have to put your car in his repair shop—hence his smile.

Ignorance of the proper way to shift gears results in the gradual wearing away of the teeth, and, in extreme cases, strips them from the bodies of the gears. In every case a noisy transmission results.

The transmission is made up of a series of gears, mounted on a main shaft and a counter shaft, with an idler gear mounted upon the transmission case. The first and second speeds and reverse are three sets of reduction gears with various ratios. High speed is on direct drive, which means that the drive shaft to the rear wheels revolves at the same speed as the engine crank shaft.

When the clutch pedal is pushed down (or "out," in automobile parlance) the engine is disconnected from the transmission, which releases the pressure of the gear teeth against each other and allows the gears to be shifted easily. The lower end of the shift lever connects with the gear-shifting forks, which are so arranged as to push the gears forward and backward on the square main shaft in order to make the different gear combinations.

Here is the whole secret of successful gear changing. The two gears about to be meshed should be revolving slowly and as nearly as possible at the same rate of speed. If one of the gears is revolving much faster than the other it is impossible to shift them without a

clash. It is therefore a mistake to let the car gain too great a speed before shifting into a higher combination.

Now, when the car is under way, pull down the hand throttle and take your foot off the accelerator so that the engine "idles" slowly, throw out the clutch, pull the lever from first speed, then clear to the left and into second speed. Let the clutch in gently and push down the accelerator until the car attains a speed of eight to ten miles an hour, when the clutch should again be disengaged, the foot removed from the accelerator and the lever pulled straight back into high position. All of these motions should be made deliberately and without haste. Usually, the automobile driver is in too much of a hurry to make the shifting smooth. Don't grasp the lever tightly in your hand—this does not help the shifting one bit, and only makes you tired. By moving the lever backward with the tips of the fingers the driver can actually feel when the gears are turning at the right speed and mesh them quietly. When the lever is gripped tightly this is impossible.

But in heavy pulling, or on an upgrade, where the car will slow down the instant the accelerator is released, the gear shifting must be made quickly and firmly in all speeds.

Shifting from high to second or low speed is just the reverse of these motions, except in the handling of the accelerator. The principle of the thing is to make the shift as quickly and firmly as possible so as not to let the gears slow down. The clutch pedal must only be pressed down far enough to barely release the clutch.

Never attempt to put the shift lever in reverse nor shift from reverse to a forward speed until the car is at a standstill. If you do, an enormous strain is thrown upon the entire mechanism.

In starting the car on a steep hill, hold down the brake with the right foot, put the shift lever in first speed and use the hand-throttle to get away, releasing the brake

lowly as the engine takes up the load; and when starting down a grade put the lever in first or high speed and let the momentum of the car shunt the engine. The economizes upon the battery and does not injure the car.

If you follow the above rules and conscientiously study the peculiarities of your own particular car—for every car has its own likes and dislikes exactly as does a horse—you will soon become an expert driver and operate your car automatically and with precision.

POCKET-SIZE TYPEWRITER NOW INVENTED.

A typewriter small enough to be carried in your coat pocket and light enough to be held in your hand, if necessary, while you are writing your letter with it, is one of the new American inventions just placed on the market.

The new invention, which promises to have a considerable demand, consists of two separate parts—the typewriting mechanism, which is enclosed in a small metal box; and the carriage, which holds the paper in writing. Ordinarily, if the typewriter be placed on a table or other suitable support, the carriage remains stationary, and the type mechanism moves from left to right across the paper. When it is necessary to hold the machine in the hand while writing the type mechanism remains stationary while the carriage with the paper held by it moves from right to left.

The type mechanism in this interesting small machine consists of two disks, the lower of which is rotatable and has on radially arranged tabs extending beyond its periphery raised characters representing the small and capital letters of the alphabet, numbers and punctuation marks. This disk is connected with an index hand with two pointers, the thinner of the pointers is used for the small letters, the broader for the capital letters. In writing, the pointer is turned to the desired letter marked on the rim of the upper disk, and a slight pressure on a button releases a little hammer which strikes

the back of the letter and causes it to leave its imprint on the paper.

HERE'S A TRACTOR THAT WALKS.

An interesting new invention in farm machinery is the tractor that walks! As is well known, most farm tractors roll on wheels or crawl over the ground on track-laying units like those on the war tanks. But a tractor that walks is, indeed, an innovation to say nothing of a vast improvement.

This result is made possible by providing sharp-pointed lugs on the bearing surfaces of the rear wheels, so that the wheel looks something like the rising sun, with the pointed lugs corresponding to the rays. The pointed lugs act on the ground as a gear or cog, and sink down to solid ground, forming a positive traction in every soil. These pointed lugs give a positive traction without surplus weight, without loss of power through slippage, and without packing the soil.

The complete tractor weight less than three ordinary size horses and does the work of nine horses. It has a very short turning radius, made possible by the use of a separate clutch for each rear driving wheel, with no differential whatever. The apparatus is adaptable to a great variety of work in farm operations, but it is especially and uniquely suitable for cultivating orchards, where it walks in and out among the low-hanging tree boughs without any difficulty whatever, because a part of the rear wheels is always below the surface of the ground.

SHOWING INDUSTRIAL PROCESSES BY "MOVIES."

A new institution in Washington is the Bureau of Commercial Economics. This bureau has successfully launched a campaign of an educational nature in which motion pictures are being used as text-books. At the head of the movement is Dr. Francis Holley, a well known scientist, who was blind for eighteen years. The history of the institution of the new project is interesting. The free

and widespread display of the motion pictures is Dr. Holley's method of keeping a vow that if he ever regained his sight he would devote the remainder of his life to teaching the rest of the world, or as much of it as he could reach, how wonderful a gift sight is.

The Bureau of Economics, while under Government supervision, is supported by voluntary subscriptions, endowment and annuities, and already has a library of over 20,000,000 feet of film to draw upon.

The films illustrate a great variety of subjects, but place special emphasis on depicting the various processes of manufacture of many articles of commerce from the raw material to the finished product.

Specially constructed motor trucks are employed by the bureau in this somewhat remarkable educational campaign. Each truck contains its own electric light plant, and carries its own standard projection machine at the rear end, and a collapsible steel frame which, when set up, will support a projection screen twenty feet wide and thirty-six feet high. The generator on the truck supplies the necessary current for a number of flood lights placed in the sides of the car body. These trucks are carrying instructive films to the remotest districts of the country, and are exhibiting them free of any charge.

During the war, the service of the bureau was placed at the disposal of the Government, and contributed very materially to the success of the Liberty Loan campaigns and the various drives for charitable and patriotic purposes.

The United States government recognizes that motion pictures of industrial processes, lives of operatives at work and at home, are of particular value just now, when the world is making such tremendous efforts—and especially the United States—to find markets for the products of its factories, mines, fields and farms.

A SUCCESSFUL TREE-SPRAYING APPARATUS ON TOUR.

One of the latest developments of the fight against tree pests is the mobile power sprayer that is touring the American western states, working in certain localities only so long as its services are demanded, and then moving to another field. The apparatus is mounted on the chassis of a stock model one-ton truck, and consists of a 400 gallon wooden tank for carrying spraying mixture; a pressure pump driven by a gasoline engine; hose, spraying nozzles, and ladders, the latter for use when unusually tall trees are to be treated. A roof shelters the pump and engine, which are located behind the tank. Curtains, which are rolled down when the sprayer is on the road, to exclude dust or in bad weather, further protect the mechanism.

With 150 pounds of pressure, spraying mixtures can be thrown to a height of 60 feet by an operator standing on the ground, while much greater heights can be reached by using ladders. A solution of arsenate of lead is used in the sprayer in warm weather, and one made with lime and sulphur in cooler weather.

ALFRED T. MARKS.

Here is a French recipe for a gum especially designed for the purpose of sticking paper labels on tin. In 150 cubic centimetres of boiling water dissolve 20 grains of gum tragacanth and add a paste made of 60 grams of flour and 10 grams of dextrine dissolved in 40 cubic centimetres of water. Dilute the whole with 200 cubic centimetres of boiling water and add 100 grams of glycerine and 10 grams of salicylic acid. Boil for five minutes, stirring constantly, and the mixture is ready for use.

ECONOMICS IN THE WEST.

Development of Trade.

London, 15th January, 1920.—An encouraging feature of the period is the steady development of trade and especially of export trade. A hungry world is demanding British goods in such tones that most of the staple industries are humming with activity. The cotton trade is especially prosperous. Immense fortunes are being made in the north out of the profits of this industry and one hears extraordinary tales of how speculative artisans are themselves joining the ranks of the rich by successful coups in the investment of their hard earned savings. A proof of the prevailing prosperity is the statement just made that the masters have agreed to disburse two million pounds in bonuses to only a section of their workers and that this section had declined the gift on the ground that the employer's generosity was inadequately manifested. All this lends special interest to a series of articles the *Times* is publishing on the world's Cotton supply by Mr. J. A. Todd. In the last published contribution, the third article Mr. Todd gives some illuminating facts relative to the present position of the fine cotton supply. He shows that while the supply of long staple cotton mainly derived from Egypt is stationary or even to some extent declining, the demand for cloth made from fine staple cotton is enormously expanding. It is of this cotton, he points out, that motor car tyre fabric and aeroplane sails are made and he calculates that for the former purpose in the United States alone about a half million bales will be required in the course of a year.

In discussing the remedies for the scarcity of long staple cotton Mr. Todd emphasises the desirability of carrying out important works of reclamation and irrigation in the

Sudan and Egypt. By reclamation alone, he calculates, a million acres would be added to the existing cotton growing land. But he shows that before works of this character can be made effective there must be an increased water supply furnished through the medium of a great new storage reservoir on the White Nile above Khartoum. The matter is of such urgency, Mr. Todd contends, that the Government would be well advised to press forward with their projects even at some risk of the adoption of methods which might afterwards turn out to be not quite the best that could have been chosen. Nothing is said in the article about the future possibilities of cotton growing in Mesopotamia, but elsewhere thus recently been stated that the country is admirably adapted to the production of the best quality of cotton and that when things have settled down the middle hand will vie with the Nile Delta furnishing the world's markets with raw cotton of the finer type. How far India might be made to share in this very profitable work of making good the deficiency in the supply recently experienced is a matter which no doubt is engaging attention now as in the past. The difficulties in the way of anything really effective being done are unquestionably great but they are probably not more formidable than those which were encountered in founding the tea industry in India and successfully overcome.

GLASS BOTTLE MAKING.

Evidence accumulates of the invigorating effects on British industry of the stern trials and exhausting requirements of the war. In many lines manufacturers were put upon their mettle to supply deficiencies created by the failure of normal supplies from abroad and they succeeded so well that they are never likely to go back to the old position. One industry which has undergone this salutary process of transformation is the glass bottle making industry, a line of enterprise in which before the war the British producer played quite a secondary part.

Of late enormous strides have been made by local enterprises engaged in glass bottle making. The gap left by the cessation of German and Austrian supplies has been by no means fulfilled, but, nevertheless, the production has been on an enormous scale in all classes of manufacture. Recognising that no permanent results are likely to be secured without the most perfect machinery and the most scientific application of financial means the leaders in the industry have decided as far as possible to pool their resources. Several moves in this direction have lately been made, the most recent of them being the acquisition by the British Glass Industries, Limited, of 76 per cent of the ordinary capital in United Glass Bottle manufacturers, Limited, this and other recent amalgamations involve a capital of three million pounds sterling. In reference to the latest transaction Sir Francis Towle one of the director, made some interesting statements which I may quote. "This amalgamation," said Sir Francis, "possesses the patents of practically the whole of the modern automatic machinery for making glassware of every kind, including bottles, fair, and window glass. The demand for glass in the next few years will be enormous, and it is the ambition of the British Glass Industries to be able to meet the requirements of the United Kingdom and afterwards enter the world's markets to compete with foreign made glass. The glass industry is passing through a very remarkable phase, it is changing from a handicraft to a mechanical manufacture, and just as machinery has revolutionised every other trade, undoubtedly machinery will revolutionise the glass trade." According to another statement, made by Dr. W. E. S. Turner, head of the Glass Technology Department of the Sheffield University, the British worker is inferior to the American in the manufacture of electric bulbs. He also stated that while the largest American glass factory employed 3,000 hands the largest British Glass factory employs

10,000 hands. From the facts given it is plain that glass manufacture is being taken very seriously in this country. In India as yet glass bottle making is in its earliest infancy, but there seems to be no reason why either in association with the British Combination as independently of it a successful industry should not be established.

If, as appears likely, a future development of industrial training in India takes the form of the establishment in suitable centres of branches of British manufacturing concerns, glass would be admirably adopted for an initial experiment, the processes have the advantage of involving no caste prejudice and of being adapted to the peculiarities of India's labouring population. Moreover, a glass factory would be readily worked by Hydro-electric power—the power which beyond almost any doubt is likely to be the future source of energy in India. But whether glass manufacturing is followed or not it is certain that the principle of a close alliance of industrial interests—British and Indian is the one which will be most conducive to the prosperity of both. On the one hand the British manufacture will be well advised to cast to the winds the theory that his processes are best kept a secret from inquiring minds from abroad, and on the other the Indian must abandon his prejudice in favour of an exclusive industry. All economic history goes to show that it is not by working in separate compartments that two countries situated as are Britain and India are made great and prosperous but by uniting the forces so that the best is made of the possessions of each. The subject is one which is sure to come a good deal to the front in the near future as the work of reconstruction proceeds apace. It is well that it should be fully considered and discussed in order that the right course may be taken.

THE DYE INDUSTRY.

The British dye industry has now got well beyond the stage of experimentalism. It is

an established and important institution with magnificent prospects. Actually at the present time it is producing 80 per cent of the dyes made by Germany before the war. The proportion though larger still however, leaves a margin of dangerous possibilities. The British dyes manufactured are the common domestic and varieties and those as yet absent from the list are the finer and more delicate shades used in the higher branches of the textile industry. It was because the British and French manufacturers could not hope to produce the latter in reasonable time that the demand was made upon Germany in the peace treaty that she should furnish dye supplies for a period of five years. The breathing time thus allowed if put to proper use will enable the British industry to be founded on an unassailable basis. Most assuredly we cannot go back to the old conditions of dependency on Germany for this essentially by product without the greatest danger to our trade interests.

AERIAL TRANSPORT.

Mr. Harry Harper, Technical Secretary of the Civil Aerial Transport Committee in a recent article makes an interesting reply to the inquiry that one often hears—what is being done about aerial transport? First he tells of the organization of the Cape Cairo route. At an expense of £50,000 to the air ministry a chain of 24 aerodromes along the 5,000 miles of the route has been arranged. Petrol supplies are now available and we may almost any day hear of the crossing of the Dark continent from end to end in a few days. Another interesting project nearing fruition is a South American Airway linking up Europe and South America by a route which starts from London and passes through Paris and Madrid to Bathurst in West Africa, from whence a flight would be made to Pernambuco in Brazil, a distance of 1,450 miles. In the United States great progress has already

been made and during the first year of the air service over 7,000,000 of letters were carried by aeroplane. Germany is making a big effort to keep well in front in the world's race for aerial transport, and Australia is making the most of her illimitable distances to create aerial routes which will bring the populous centres into closer contact. Slow moving China, too, has been caught by the fever and is installing under British guidance an aerial transport system; while Japan is making ready for an aerial mail between Tokio and Osaka, a distance of 300 miles. Finally we are told by Mr. Harper that as regards India a weekly postal service is being organized between Bombay and Karachi. The record perhaps is not such a remarkable one as might have been expected so long after the Armistice but no doubt in the next phase of development the pace will be quickened. At least we may hope that the day is not far distant when the Indian mails will be carried by air.

ARNOLD WRIGHT.

During January last 87 joint stock companies were registered in India with an aggregate authorised capital of nearly Rs. 23 crores, as against 32 Companies with an aggregate authorized capital of Rs. 2 crores in the corresponding month of the proceeding year. Bengal accounted for 49 companies (nearly Rs. 7 crores) and Bombay for 18 Companies (about Rs. 14 crores). For the ten months, April 1919, to January 1920, the number of Companies registered was 721 with an aggregate authorized capital of over Rs. 224 crores, as against 219 Companies with nearly Rs. 10 crores of authorized capital in the corresponding period of the preceding year. The largest floatation in January was that of the Anglo-India and Colonial Navigation Co., Bombay (Rs. 10 Crores).

NOTES.

The Hon'ble Mr. Gideon Murray, M.P., late Food Commissioner for the West of Scotland, and one time Administrator of the Governments of St. Vincent and St. Lucia, was to have addressed the members of the Glasgow Chamber of Commerce at a General Meeting held on 11th November last. Owing to its being Armistice Day the address was not delivered, but excerpts from the address are published in the Glasgow Chamber's *Journal* for June, 1919. We quote the following passages relating to the sugar industry in the West Indies:—An instructive memorandum has recently been issued by the West India Committee in London regarding the possibilities of development of the British sugar industry. The Committee point out that the imports of sugar into the United Kingdom from all sources prior to the war amounted to 1,969,259 tons. Of this quantity, only 72,000 tons were from British sources whilst 1,300,000 tons were imported from Germany and Austria, although an additional quantity of 500,000 tons was produced within the Empire, but this was either consumed locally or exported to foreign countries. The Committee have ascertained through official sources, carefully estimated in conjunction with agricultural societies, that the British sugar industry could be expanded to 4,541,000 tons a year, or over twice as much as the annual consumption in the United Kingdom before the war. The following figures indicate particularly how this applies to the West Indies:—

		Present Sugar Crops (Average of 3 years).	Possible Sugar Crops.
		Tons.	Tons.
Barbados .. ..	...	35,000	51,000
British Guiana ..	...	105,000	2,500,000
Jamaica .. ..	...	15,000	35,000
Trinidad .. ..	...	50,000	87,000
The Windward and Lee- ward Islands.		26,000	67,000

Thus we see that in British Guiana alone the sugar output could be increased from 105,000 to 2,500,000 tons, or enough to satisfy the whole needs of the United Kingdom for one year. In order, however, to secure capital for this enterprise, the requisite labour and markets must be secured. Fortunately, His Majesty's Government have recently adopted the policy of Imperial Preference. This will create the security of market desired, and should act as an important lever in inducing commercial bodies to use all endeavours to persuade the Imperial and India Governments to come to an arrangement with regard to the provision of Indian labourers. The war has proved that sugar is an essential industry, and that we can never again afford to rely upon foreign sources for our supplies. Here is an opportunity for India.

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The following Order—No. 147, Revenue (Special), dated 22nd January 1920—has been issued by the Madras Government:—Forest panchayats were first started in 1914 as a result of the recommendations of the Forest Committee, but they have not been as successful as was hoped. In its latest review on the working of forest panchayats published in March last the Board of Revenue remarked that the good panchayat was the exception that many were possible while many were bad. Further there are at present 210 forest reserves under the management of 353 panchayats but there are still 222 reserves of class V with a total area of over 500,000 acres which are not under panchayat management; probably therefore another 200 or 300 panchayats should be formed in connexion with these reserves. It is also possible that panchayats may be formed in connexion with the forest village and kancha grazing systems. The Government are anxious that the work of the existing panchayats should be improved and that the system should be extended as soon as possible; they have therefore resolved to place an officer of the Indian Civil Service on special duty for these

purposes. His deputation will in the first instance be for a period of six months. The officer selected for the appointment is Mr. D. G. Bles, who is due to return from leave on 14th February 1920. On his return, he will report himself to, and work directly under, the Chief Conservator of Forests and his headquarters will be at Madras. His first duty will be to examine the working of existing forest panchayats with a view to ascertain the reasons for their success or failure. Three months should be sufficient for this enquiry: the special officer will then submit through the Chief Conservator of Forests a preliminary report dealing with the modifications required in the system as at present applied and the methods by which it can be stimulated and controlled in the future. The report should include a statement of the temporary or permanent special staff considered necessary for the reorganization of existing panchayats and the creation of new panchayats and for their inspection and general control in future. While thus employed Mr. Bles will be permitted to draw the pay and allowances (including tentage) admissible to him in the regular line of the service together with a deputation (local) allowance of one-fifth of his salary subject to a maximum of Rs. 10 per day. The temporary staff required by the special officer in connexion with his preliminary enquiry may be sanctioned by the Chief Conservator himself under section 8 of the Forest Department Code. The Chief Conservator is requested to report how the extra cost during the current year can be met.

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The following Resolution of the Industries Dpt. (No. 1711—Dated 26th February) has been issued by the Government of India:—In accordance with the announcement made in Resolution No. 81-D., in the Department of Commerce and Industry, dated November 15th, 1919, the Government of India have now decided to reconstitute the Indian Muni-

tions Board as a Board of Industries and Munitions. The new Board will be a temporary organization, designed to close the war commitments of the Indian Munitions Board, to take over from the Commerce and Industry Department and the Public Works Department certain items of work, and to undertake the initial work of industrial organization and in particular to frame detailed proposals for a new Department of Industries. The new Board will come into existence on March 1st, 1920, and will consist of a President and two members. The following gentlemen have been appointed to these posts:—President:—The Hon'ble Sir Thomas Holland, K.C.S.I., K.C.I.E., F.R.S. Members:—Thomas Ryan, Esq., C.I.E., A. C. Chatterjee, Esq., C.I.E., I.C.S. As the Indian Munitions Board will be merged into the new Board, all correspondence intended for the Indian Munitions Board should hereafter be addressed to the Secretary of the new Board. The Board of Industries and Munitions will take over at the same time the following heads of business:—From the Public Works Department, Electricity. From the Department of Commerce and Industry:—1. Geology and Minerals, including the Geological Survey of India and the administration of the Indian Mines Act, 2. Salt, 3. The Indian Explosives Act and the Indian Petroleum Act, 4. Stationery and Printing, 5. The Indian Factories Act, 6. Inventions and designs 7. The administration of the various Acts relating to Steam Boilers. 8. Industries, The control of Ordnance Factories having been transferred to the Army Department, all correspondence relating to them and intended for the Government of India should be addressed to that Department instead of to the Indian Munitions Board as heretofore. Upon the formation of the new Board, the Government of India, Department of Commerce and Industry, will be known as the Department of Commerce.

An interesting account of a successful experiment which has been carried out at Fellujah, on the River Euphrates, about thirty-eight miles west of Baghdad, with peanuts (or groundnuts) has been furnished by the United States Consul at Baghdad. One of the most remarkable facts about Mesopotamian agriculture is the scarcity of oil seeds among the crops grown in the country. Practically no oil seeds are grown, with the exception of a little sesamum and linseed. In other Oriental countries oil seeds are quite commercial crops. India, for instance, has its linseed, cotton-seed, coconut, gingelly, rapeseed, sesamum and peanuts, while Egypt has its cotton and sesamum, and China its soy beans. Considerable interest, therefore, is attached to an experiment with peanuts carried out at the Fellujah Gardens. The plot was only a small one, about one-tenth of an acre being sown. The crop was sown in June and lifted in November. The person in charge of the garden had no experience of this crop, and sowed some what too thickly and overwatered, yet the crop when first lifted gave 2,550 lb. of nuts, which, when dried, gave 1,800 lb. per acre. Peanuts are already in considerable demand in the country, large quantities being imported from India. At present the nut is consumed in a parched state or is used for making sweetmeats. Later on, when the production exceeds this local demand, the surplus will find a ready export as an oil seed. The variety grown at Fullujah is a tight-husked variety, with a very attractive bright-red skin, known as the small Japanese. It was not known in Mesopotamia before, and local merchants who have seen samples have been much interested. It has the advantage of being quick growing, requiring comparatively little water and being easy to dig. Demonstration plots at various centres were to be arranged for this year by the Agricultural Department, and it should be possible to establish this crop on a commercial scale in a short time.

The main feature of the report on Indian Education in 1918-19 shows that expenditure increased by over Rs. 116½ lakhs and now stands at the unprecedented figure of Rs. 12,98,63,073. Public institutions have increased by 2,820 and the number of pupils in them have also increased, though only by small figure of 26,321. These pupils now number 7½ millions. Even in these public institutions boys show a decline but the situation has been saved by girls whose number has increased by nearly 50,000. Private institutions have declined by 2392 to 35,017 and their pupils by the 38,412 to 597,914, though here also there is a slight increase of girls. The net results are a total of 197,347 institutions and of 7,936,577 pupils, the former representing a small increase and latter a decrease of 11,491. But it is on public institutions that attention naturally focuses and the lack of any increase of pupils corresponding to the great increase of facilities. The fact that girl pupils show an increase against a decrease among boys is not the unnatural characteristic of years of pestilence and famine and the aftermath of war. On the other hand the renewal of expenditure on educational expansion and improvement and the large increase of public institutions give hope for a rapid restoration of progress in future. In the quinquennium ending 1902, the average annual expenditure on education was Rs. 376 lakhs. In the quinquennium ending 1907 this figure increased by Rs. 118 lakhs and in the next quinquennium ending 1912, there was further increase of Rs. 196 lakhs. The average expenditure in the quinquennium ending 1917, though this included nearly three years of war, showed an increase of Rs. 357 lakhs and the last two years have again shown an average increase of Rs. 130 lakhs. In 7 years, for the most part years of wide-spread disaster, the annual educational expenditure in India has come within reasonable distance of doubling itself.

Pending the formulation of a complete scheme for the medical inspection of schools and pupils to meet future as well as present needs, the Director of Public Inspection Madras has submitted the following proposals to meet the immediate requirements of recognized secondary schools under the management of local bodies or under private management:—It has been calculated that the average cost of medical inspection for a pupil comes to about 12 annas for the 1st inspection while about 6 annas will be the average cost of each subsequent inspection. The Director of Public Instruction purposes that the cost of inspection should be divided as far as possible equally between Provincial Funds, managements funds and fees. He accordingly asks to be permitted to sanction grants to managers of aided institutions equal to not more than one-third of the cost of the scheme of medical inspection that they introduce, subject to a limit of 4 annas per pupil on account of each first inspection and 2 annas per pupil for each subsequent inspection. If the management is not prepared to levy a small fee from the pupils for medical inspection it must itself bear the additional cost. In the case of institutions under the control of local bodies the award of a subsidy for meeting the cost of medical inspection is to be conditional on fees being levied to cover at least one-third of the total cost of inspections. The Director of Public Instruction also proposes to sanction grants this year subject to the above conditions to schools which have already carried out medical inspections. The Government have approved of those proposals. The name of the medical officer selected for inspection must be submitted to the Director of Public Instruction for approval. The management of the school will be required to maintain the records and submit the returns prescribed for the purpose and to comply with all conditions imposed in this regard by Government or their authorized officers.

The Detroit correspondent of the New York *Herald* reports that Mr. Henry Ford has announced that he will establish factories in many parts of the United States for the manufacture of automobiles, which he will sell for £50 each. Mr. Henry Ford, the automobile manufacturer, was born in Greenfield, Michigan, on the 30th July, 1863. Before he organized the great company which bears his name, he was the Chief Engineer of the Edison Illuminating Company. In the year in which the war began, he announced his plan of profit-sharing, which in his personal application involved the distribution of £2,000,000 annually among his employees. A few months ago Edsel Ford, aged 24, son of Henry Ford, was elected President of the Ford Motor Company at a salary of £30,000 a year, in succession to his father, who announced his own retirement from the active direction of the company in order to give younger men a chance. As his last official act, the elder Ford raised the minimum daily wage throughout his factories to 24s. displacing the previous minimum wage of 20s. made effective four years ago. This minimum applies to 28,000 employees, while there are 23,000 others who are receiving more than this sum. Henry Ford said:—"This is the age of young men, and I want to show the world that I stand at the back of my belief that young men are entirely capable of directing big business." Edsel Ford will thus have the full executive control of the Ford motor-car production, which represents an investment of £20,000,000. Mr. Henry Ford will concentrate his own genius on the furtherance of the production of tractors, and will give some of his time to a weekly periodical known as the *Dearborn Independent*, *Henry Ford's International Weekly*. The paper carries no advertisements and Mr. Ford says that he will spend £2,000,000 to make it a success.

The Report on the Administration of Travancore for the year 1094 M.E. (1918-19) says:—There were during the year three silk

farms, at Trivandrum, Nedumangad and Tiruvella. The area under mulberry cultivation has considerably extended both under departmental control as well as private agency. The students who went out of the silk school in previous years and who had commenced silkworm rearing in their villages had their cultivation improved and extended under the supervision of the department. Experiments on the rearing of the Pusa Hybrid seeds were continued in the Silk Farm at Trivandrum. Rearing was also conducted in the silk farm at Tiruvella and by the students who passed out of the silk school at Trivandrum. During the year, 206 lbs. of green cocoons were obtained from 646 layings of eggs reared by the department and by private men under the supervision of departmental officers. The cocoons produced in the farm and those purchased from outside were reeled in the Silk Farm at Trivandrum and a portion of the yarn obtained therefrom was woven into fairly good silk which found a ready sale locally. The silk school at Trivandrum continued to do good work. Out of the 8 boys who attended the school during 1092-1093 M. E., 6 passed the final examination which was held during the year. The students who passed out of the school are popularising the industry in their villages. Those students who were engaged in the industry received the usual financial encouragement from the Darbar, namely, an initial grant of Rs. 30 per head and recurring grant of Rs. 5 each per mensem. The Director has submitted a scheme for the extension of the silk industry in the State and the scheme is under the consideration of the Darbar.

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A bulletin of the Madras Publicity Bureau says:—The need for stimulating the production of foodgrains in this Presidency is recognized on all sides. The Publicity Board has therefore decided to offer a prize of Rs. 50/- for the leaflet best calculated to induce the ryots to increase the production of foodgrains. It has been suggested that many

ryots might increase their production of foodgrains in one or other of the following ways:—

(1) By digging wells, (2) By using more manure, (3) By substituting foodgrains for industrial crops, (4) By taking advice of Agricultural officers in taluks where Agricultural officers are stationed, (5) By bringing under cultivation waste land not needed for public purposes. If the leaflet is to influence the ryots, it should not be too long. It should be written in a simple style. It should deal with concrete facts within the knowledge of the ryots, in as vivid a manner as possible. It has been suggested that it would be most likely to attract attention of the ryot if it took the form of a dialogue. But it is open to the competitor to choose whatever form he prefers. The prize will be assigned to the leaflet which appears most likely to have a useful practical effect upon the ryots' practice. Competitors for the prize should send in their leaflets to the Publicity Bureau, Victoria Buildings, Commander-in-Chief Road, Egmore, Madras, before the 1st of April. Leaflets may be either in English, Tamil, Telugu, Malayalam or Kanarese. They may either be designed for general use throughout the Presidency or specially suited to the circumstances of any district or tract.

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Some particulars are given in *The Engineer* of the plant and machinery of the Panama Canal. The power required is obtained by utilizing the flow of surplus water over the Gatun Dam, the height of which above sea-level enables an average effective head of 75 feet to be realized throughout the year. The power-plants at first installed comprised three turbines, each of a rated value of 2,250 kilowatts when running at 250 revolutions per minute and supplied with 500 cubic feet of water per second. A flow of 500 cusecs, with a fall of 75 feet, produces nominally 3,160 kilowatts, so that there is an efficiency margin of 37 per cent. The demand has been found to be much

under-estimated, and it has become necessary not only to provide three additional machines of greater capacity, but also to increase the output of the existing generators. Of the three additional machines, only one is yet in position, but when the installation is complete there will be three units of 2,880 kilowatts each, and three units of 4,500 kilowatts each, totalling 22,140 kilowatts, and requiring a supply of just over 4,000 cubic feet of water per second. The electric energy is employed to drive the machinery of the locks at Gatun, Miraflores, and Pedro Miguel, of the haulage locomotives, of the permanent machine-shops, of the dry dock, and of the coal-handing plant, besides lighting the locks, and many towns comprised within the canal zone.

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The following Order—(No. 555, Home (Miscellaneous), dated 4th March 1920—has been issued by the Madras Government:—At the meeting of the Legislative Council held on the 19th November 1919 the Hon'ble Mr. Narasimha Ayyar asked the Government whether it was intended to run a Blue Book Quarterly in this Presidency and he was told in reply that the Government would consult the Publicity Board. This body, whose opinion was accordingly invited, have suggested that a monthly list containing a brief review of all the publications of the Publicity Bureau and such other important publications of the Government may be issued and that a Quarterly like the Blue Book Quarterly of Bombay will then be unnecessary. The Government also made inquiries of the Government of Bombay as to the measure of success achieved by the Quarterly but were informed that it had to be abandoned owing to the poor support it had received from the public. The Government have therefore decided to adopt the suggestion of the Publicity Boards as an experimental measure, and the Publicity Officer will accordingly be requested to arrange in consultation with the Superintendent, Government Press, for the

regular publication of a monthly list, which should be printed in demy 8 vo size and supplied free of cost.

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The latest report on public instruction in Baroda, affords interesting reading. Considerable progress has been made in all the branches of educational activity, such as female education, technical education and education of the masses. The number of institutions for imparting instruction comes to 3,199 and the percentage for males of school-going age attending schools is 90.5 while in the case of females it is 72. Great attention has also been paid towards the extension of vernacular primary education. Almost every village has got its own primary school, the exception being in the case of only the very smallest villages. Besides, there is a network of libraries throughout the whole state which are easily accessible even to the remotest villages. The compulsory age limit for boys in between 8 and 14 years and for girls 8 and 12. It appears from the report that efficiency is being attained in every direction. The technical side of the education has received a due share of attention. Training is given in Agriculture, Commerce, textile manufacturing dyeing, mechanical engineering and carpentry. Much encouragement has been given to the study of Sanskrit. Nothing remains to be desired on the side of making the whole system of education comprehensive.

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Attention is drawn in the *Bulletin of the Federation of British Industries* to the United States Official Commerce Report of November 15th, dealing with the potentialities of aninga fibre. Ambinga is a Brazilian plant which is chiefly found along the banks of those rivers of Para whose slow current allows a soft mud bed for its roots. The plant constitutes the raw material from which cellulose, for the manufacture of linen paper, is obtained, and may also, under chemical treatment, be transformed into

artificial cotton fibre. experiments on a large scale were started last year with excellent results, and it is stated that a new process for dissolving the fibres has been discovered, which transforms them into very fine white fibres. These resemble cotton fibre of high quality, but are considered to be superior to it, inasmuch as the lines of the anhinga fibre are straight and parallel. It is declared that the State of Para is capable of producing 1,00,000 tons of fibre for export annually, and a mill already in operation has a daily output of 600 kilos. The price of the fibre at Para is between 300 and 350 reis—roughly equivalent to 5d. in English currency—per kilo.

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A recent number of the *Weekly Bulletin* of the Candian Department of Trade and Commerce contains a description of a species of Australian grass tree known as the "blackboy" tree, which flourishes in most parts of the continent, and especially in Western Australia. The peculiar interest of this tree, which grows to a normal height of from 7 to 10 ft. is the variety of commercial purposes to which it can be put. The tree contains gum in large quantities, and amongst other by-products extracted under treatment are tars (free from harmful acids), tarpaulin dressings, rope and sanitary tars, lacquers (such as Japan black), steam and refrigerating pipe lagging, paint for ironwork that requires stoving at high temperatures, stains, and paints; phenol, benzol and alcohols, coke, potash and pyrogenous acid. Although until recently no attempt has been made to utilise the tree commercially, a company has now been formed to extract and market its by-products. Not only have all the articles already enumerated been obtained, but the company also intend to produce dyes, perfumes and formalin, and various kinds of varnishes.

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Sir Harcourt Butler presided recently at a meeting of the Committee to reconstitute the

Allahabad University. His Honour, in the course of his speech, said:—I wish to put before you the ultimate ideal, namely, unitary teaching and residential universities in this province, at Allahabad, Benares, Lukhnow, Agra, and Aligarh, and it may be before long at Cawnpore. To ensure this and carry out the recommendations of the Sadler Commission, we shall have to face big changes. The existing institutions have done great work, but we must be prepared to sacrifice some of their present advantages for the larger educational life that is to come. Certain draft resolutions were then discussed. They were that (1) intermediate education with broader and more diversified courses should be the stage preliminary to university studies; (2) in no case should open intermediate education be combined with university education; (3) a new examination should be instituted to be taken up at the end of the intermediate course as a test for admission to university and higher studies; (4) and that there should be a Board of Secondary and Intermediate Education.

.. ..
The total output of coal in the United Kingdom in 1918 was 227,748,654 tons, and the value 238,240,760 showing a decrease in the output of 20,750,586 tons and an increase in the value of 30,453,866 on the figures for 1917. The average price of coal was 20s. 11'06d. per ton in 1918 as compared with 16s 8'68d. in 1917. The quantity of coal exported, exclusive of coke and manufactured fuel and of coal shipped for the use of steamers engaged in foreign trade, was 31,752,904 tons. France received over 16½ million tons, Italy over 4 million tons, Egypt nearly 1½ million tons, Gibraltar over 1½ million tons, Norway over 1½ million tons, Malta nearly 1½ million tons, and Sweden and Denmark each over 1 million tons. The amount of coal remaining for home consumption was 184,358,158 tons, or 4'385 tons per head of the population.

Messrs. S. E. Saunders, Ltd., of East Cowes, the well-known builders of air and marine craft, have forwarded some specimens of their "consuta" plywood. The component layers, after being cemented together, are sewn through with rows of parallel stitching. It is claimed that this process gives to "consuta" a super-added strength and stability which make it the strongest and lightest material yet evolved. It has been used for the last twenty years in the construction of racing motor-boats, gondolas for airships, hulls for flying boats, etc. Hitherto the material has been handsewn, but it has now been found possible to produce the material by machinery and in commercial quantities.

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At a meeting of the Senate of the Calcutta University, a letter from the Bengal Government on the subject of election for the seats in the Provincial Legislative Council allotted to the Calcutta University under the Reforms scheme was considered. It was resolved that all qualified graduates of this University, who have a place of residence in India, be allowed to vote and that such of the graduates as are resident or domiciled beyond the territorial limits of this University, be allowed the option to vote at the election either of this University or the University of the place where they reside or are domiciled.

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The Kingston (Jamaica) correspondent of the "*Times*" *Trade Supplement* reports that the sugar industry is booming in the largest of our West Indian colonies. "The transformation in some centres is remarkable. Large properties have been brought under cultivation, especially in the central section of the island. Bananas have given way to cane plants; large sugar factories have been erected, two of them being in operation, while a third—the largest central in the island—will be at work early this year." A scheme for the establishment of a Government central factory is under consideration.

GLEANINGS.

The position of engineer on a tea garden is not an altogether a enviable one says the engineering, as the pay, generally, is poor, and it very seldom leads to anything. To this fact is said to be due the relatively small improvement shown in tea machinery; those who might, in time, involve change as a result of practical working often leave the calling before their interest has been properly aroused. As a result, the design of such machinery is left to manufacturers who under difficult circumstances make an exceeding good job of interpreting problems in which greater first-hand experience would probably carry them much further. In a paper read some time ago at Dibrugarh, Assam, before the Assam Section of the Junior Institution of Engineers, by Mr. C. M. Patterson, the authors draw attention to a design of driving machines in which, he says, the coal used is very largely employed merely in heating up the factories. He points out that, in the first place, the heater pipes from the stoves are usually exposed and that the stove back plates, usually in a state of red heat, are exposed. The air duct leading from the stove to the drying chamber is also exposed. The drying chamber casing, further, is unprotected. The total surface of 1-14th iron plating exposed in this machine is calculated by the author to be about 1,150 square feet. Obviously this results in an enormous amount of waste heat, and economy in this direction might well receive the attention of the manufacturers. The saving effected would soon pay for some extra initial cost of improved apparatus.

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What a destructive pest the rat is in India the extent of the damage it has caused during the two past decades and what it has cost the State are brought home forcibly in a paper written by Major J. C. G. Kunhardt, I.M.S. Indeed, the rat has a fearful account to render to mankind not only by way of the diseases it causes plague, rat-bite fever, Well's

disease and others but also by way of the material damage for which it is responsible and the expense incurred in rat destruction and anti-plague measures generally. From plague alone, during the past twenty-years, over ten millions have perished. An estimate based on the acturial report on the last Census of India shows that, calculating the loss per head at the rate of Rs. 600 per head, the total loss to the State due to the death of ten millions individuals is Rs. 600 crores. Another estimate puts down the number of rats in India at 800 million both house and field, and the value on the grain they have eaten during twenty years at Rs 300 crores. But if we add the cost of the damage done to standing crops, fabrics, structures, furniture, etc., the total bill of costs figures at Rs. 600 crores. Then there is the costs of anti-plague measures, which is nearly Rs. 40 crores. The grand total in twenty years is shown at Rs. 1,240 crores.

At a meeting of the Wireless Society of London, held at the Institution of Civil Engineers, Great George Street, Mr. R. C. Clinker, of the British Thomson-Houston Company, Limited, showed a wireless receiver which can be installed in the home for about £30. The apparatus, which will take messages from all the principal wireless stations of Europe, is contained in a box 15 inches wide, 12 inches broad, and 5 inches deep and light enough to be carried by a leather handle. Mr. Clinker explained that this portable receiver was originally intended for receiving in time signals from Paris, and for the use of clock makers and others, to whom a knowledge of exact time was of importance. It only needs to be placed on a table, the sounding telephones connected, and it is in working order. No external aerial wire is required.

A Government of India Department of Commerce, Notification, dated Delhi, the 6th March says:—In exercise of the power conferred by section 23 of the Sea Customs Act, 1878 (VIII of 1878), the Governor-General in Council is pleased to exempt nitrate of ammonia from import duty leviable thereon under item No. 93 of Schedule II Part IV, of the Indian Tariff Act, 1894 (VIII of 1894) as subsequently amended.

Lord Ronaldshay presided at the first annual meeting of the recently established Board of the Bengal Agricultural Department. This Board has no direct connection with the Provincial Agricultural Association of Bengal, and is formed on the lines of the Royal Agricultural Society of Great Britain. Its functions are wholly advisory. It will devote its energies to the scientific solution of agricultural problems peculiar to Bengal, and will advise the Government with regard to them.

It is reported that counterfeit five pound Bank of England notes have been put into circulation and it is possible that these counterfeit notes may find their way to India. The Public is therefore warned to take precautions before accepting five pound Bank of England notes if these are offered in this State in payment or in exchange for Indian currency.

The efforts to cultivate (experimentally) Lemongrass in U. S. A. so far show that overhead costs could not be borne by this one crop, but it could probably be commercially undertaken with success in conjunction with the growing of other similar plants.

A Press Communique of the Government of India says:—It is notified for general information that the prohibition on the importation into India of dyestuffs which was imposed last September is being removed with effect from the 13th instant.

The Indian Munitions Board have issued a monograph entitled "The Manufacture of Paint and Varnish in India," by Mr. N. Brodie, B. Sc. Copies may be obtained from the Superintendent, Government Printing, India, Calcutta. Price, four annas.

A new trade Marks Act comes into force in England on April 1st. It sets up an additional schedule of trade marks and provides remedies for infringements.

The new German constitution provides among other things that "scientific institutions shall be free and accessible to all Germans, according to their capacities".

A Census of British production is to be taken next year.

TOPICS FROM ECONOMIC PERIODICALS.

In an interesting article on the dwarf coconut, in the *Agricultural Bulletin of the Federated Malay States* for September and October, 1919 Mr. Will. P. Handover says:—

The increasing rise in the price of copra having given renewed activity to coconut planting in this country it is important that some facts of this interesting variety of coconut should be put on record.

Description.—The dwarf coconut known in this country as "nyiur gading" is remarkable for its early fruiting, palms only 10 feet high bearing abundant fruits touching the ground. The young palm grown under good conditions starts to flower in its third year and produces ripe fruit in about nine months from the appearance of the flower spike. The initial flower spikes contain only male flowers, but other spikes occurring in rapid succession, are larger and bear an increasing number of female flowers also, a spike from a six-year-old tree being counted with 200 young female flowers, whilst trusses of fruit from similar trees have been found with as many as 55 ripe nuts.

The dwarf coconut is generally of a bright yellow colour and Winsted? in his quotations from *Malayan Folk Lore* speaks of "'nyiur gading,' the golden coconut only to be found in princes' gardens."

There is besides, a distinct brick-red variety, also a green variety, and a number of intermediate colours which might be ranged as ivory yellow (hence "gading"), golden yellow, orange, brick red, green bronze, and deep green. The flower spikes, leaf bases, and leaf ribs, correspond in colour with the fruit, giving the compact trees a very handsome appearance. Again there are semi-tall trees of these different colours, which are later coming into bearing, have slightly larger nuts, and are less prolific than the true dwarf.

The dwarf yellow strain appears as the most prolific whilst the other varieties vary proportionately in their productiveness and also in the shape and size of the nut and are evidently the outcome of cross fertilization from original types or "mutants."

The different varieties are distinguished amongst the Malaya and Javanese under particular names, such as *nyiur (klapa) gading*, *k. merah* (or *raja*), *k. kapak*, *k. pisang*, *k. puyok*, *k. babi*, *k. sepang* and *k. nipah*.

A full grown leaf of the "nyiur gading" measures only 12 feet from base to tip whilst an average ripe nut $22\frac{1}{2}$ in. \times 24 in. in circumference, and the palm stem 24 inches in girth, the nut has an average amount of fibre, a thin shell, and proportionately with the big nut, a good thickness of white kernel.

This "meat" is said by the Malays to be richer in oil and sweeter in taste than that of the big coconut and it is therefore very popular with them for domestic purposes.

History.—In spite of diligent enquiry it has not been possible for the writer to find out the definite origin of this dwarf nut, but it seems first to have occurred as a "sport" or "mutant" probably in Java. Trees, thirty years old or so, occur in different parts of the peninsula and many of these still bear abundantly.

In 1912, 500 acres were planted with these dwarf nuts at Sungei Nipah Estate, on the Coast between Port Dickson and Sepang Point and this is probably the only estate of dwarf coconuts in the world. The seed nuts for this, were obtained from trees, then about 12 years old, grown by the Malays on the "bendangs" of the Krian rice district, who are reported to have got their original seed, individually at a dollar each, from ships arriving at Penang probably from Java.

From reliable reports from India it appears that this dwarf form is practically unknown, either in Malabar, the Madras Presidency, or Ceylon, though isolated groups as that of the "king coconuts" at Mount Lavinia doubtless occur.

Scattered trees also occur throughout Java and Sumatra, but not in any quantity, seed for planting having been sent to all the places named, also to Manila, and to the northern and eastern States of the Malay Peninsula.

Growth.—Like all coconuts, this dwarf form appears to be exceedingly hardy, growing well either in white clay, red loam, or deep peat, in fact it seems to thrive in any situation where water is abundant, yet not stagnant, though it is evident that well drained alluvium suits it best.

In such a soil six-year-old palms have been counted with 234 nuts on (excluding ovules) and the trees average 80 nuts a year.

The only figures available are those from Sungei Nipah where, unfortunately, the young palms were allowed in the early days of the war to get choked by lalang during the third year, and although they have responded wonderfully to better treatment since, this setback at so critical a period, will doubtless have its effect throughout the life of the trees. The Malays say "nyiur gadang suka perkawan" and

palms near dwellings readily demonstrate how well it responds to good treatment.

Crop—In the first year of production at Sungei Nipah the crop over 225 acres was 102,000 nuts whilst the second year it was 574,000 nuts and the third year it will probably be nearly a million; from which the writer considers an average yield for dwarf nuts may be predicted as follows:

At the end of 4th year = 1st yielding year = 10 nuts

			per tree.
5th	2nd	30	"
6th	3rd	60	"
7th	4th	80	"
8th	5th	100	"
9th	6th	120	nuts
			per tree in full bearing.

These estimates in face of yields from individual trees will appear conservative but there are many points which have to be considered when dealing with *average* yields, and no doubt under ideal conditions a much higher average could be obtained.

In making *copra*, it has been found that the nut from a young tree is smaller than that coming later, and its kernel likewise thinner, whilst of course on heavy yielding trees the nuts are a little below the average in size, but 500 nuts to a picul of copra is a general average, which would be decreased somewhat later as more even nuts with thicker "meat" were obtained. With the leaf length only 12 feet it was found convenient to plant the palms 24 ft. x 20 ft. which gave 90 to the acre, a number nearly double to that required when planting big palms.

It will be evident therefore that with this planting we should get, say, in the fifth year of planting 90×30 nuts = 2,700 nuts per acre = $\frac{27}{5} = 5\frac{2}{5}$ piculs copra per acre. Likewise, in the ninth year $90 \times 120 = 10,800$ nuts per acre = $\frac{108}{5} = 21\frac{3}{5}$ piculs copra per acre. Comparing this with the big coconut which does not produce till *after* its fifth year but might be estimated as giving in its ninth year 45 trees at 40 nuts = 1,800 nuts per acre $\frac{1800}{225} = 8$ piculs of copra per acre. With the dwarf trees there is the great advantage of easy and rapid picking, and inspection for beetles and other pests, though of course in manufacture one has to handle almost $2\frac{1}{2}$ times the number of nuts per picul of copra, but this is not of so great consequence when working with newly devised methods and machinery, dealing with large quantities.

The profit per acre from five-year old dwarf coconuts to-day can even stand comparison with that of rubber, and the man who is planting to-day, has to consider markets five years ahead and might do worse than place confidence in the dwarf coconuts.

WHY PRICES ARE STILL SO HIGH.

In a note issued by the Madras Publicity Bureau, we read:—

It is now more than a year since the war with Germany was ended, and a good harvest is now being reaped. Yet the prices of food grains and of other goods have not yet fallen. People ask why this should be so. The real reason is the waste and loss caused by the war. Even though the war is ended, the waste and loss cannot be repaired in two or three years. The fact is that the whole world is poorer than before owing to the waste and loss caused by the war, and this is the reason why prices are high.

2. Suppose that two ryots were engaged in a long law suit and spent much money on lawyers and witnesses. Even after the suit has been decided, they generally find that they are both poorer than they were before the suit began. They will have to work hard for many years to save enough money to make themselves as rich as before.

3. Now almost all the nations of the world were fighting for five years, and it was only last year that the dispute was settled. Now that the war is over, Germany which lost the war appears to be almost utterly ruined. Even the nations which won the war find that they are far poorer than before.

4. When ryots grow poorer than before, the fact is made known to them when they find that they have less money with which to buy cloth or oil and the other necessities of life. But now that the whole world is poorer than before, the fact is made known to us when we find that though we have as much money as before the money will not buy as much cloth, as much oil or as much food as it did before the war.

6. We have said that the reason why prices are higher than before is because the world is poorer than before. When we say the world is poorer than before, what do we mean? We do not mean that there is less money, less gold or less silver in the world than before. It is not money or silver or gold or notes that make the world rich. Suppose ten men are living on an island by themselves in the middle of the sea and that they have no boat to take them away. Suppose they have with them a lakh of silver rupees but no clothes and no house, and only just enough food to keep them alive. Then it is clear that these men are not rich but poor. It is not gold or silver or notes which make men rich. We call men who have much gold and silver and notes rich because they are able with their gold and silver

and notes to buy many useful things. But if they can no longer buy sufficient food and clothes with their gold and silver they will be no longer rich. It is true that gold and silver are good for making ornaments. But if we cannot get food and clothes, of what use will ornaments be?

6. Thus when we say that the world is poorer than before, we do not mean that there is less money in the world than before. On the contrary there is far more money than before. Many countries that were fighting had to issue countless paper notes to pay for the guns and rifles which they needed. The soldiers when they fought did not destroy the gold or silver. They did not even burn the paper notes. There is therefore as much gold and silver in the world as before the war, and there are far more paper notes.

7. When we say the world is poorer than before the war, we mean that there are fewer useful things in the world than before the war. In time of peace, most of the men in Europe and America, young and old, are engaged in producing useful things. Some are cultivating food-grains, others are making ploughs or carts, cloth or sewing machines, etc. But in the war time the young men were fighting as soldiers and the old men were making guns and shells and gun-powder. They had little time to cultivate the land or to make the things which we need in peace time. At the same time, the armies were in many countries destroying the railways, the railway engines and the railway carriages that we need in peace time, and the factories where these and other useful things are made. Even now in Russia the people are fighting with each other and burning the villages instead of growing wheat for the benefit of themselves and other countries of the world.

8. So now there are fewer useful things in the world than before the war, while there are far more silver and gold coins and paper notes. So, is it not natural that silver rupees and notes will buy less than before the war? If the men on an island have a lakh of rupees but no food, they will be willing to give all their rupees to get food.

9. But some one may say: This is no doubt the reason why prices are high in Europe. There was war there, much property was destroyed, the factories were damaged, the men were serving as soldiers instead of cultivating the land, and the Government issued paper notes to pay for the munitions they required. We can therefore understand why prices have risen in Europe. But in India there was no war and no damage was done and the ryots went on cultivating the land as before. Last year indeed the crop failed and the price of rice rose. But this year we have a very good crop. Why then should the

price of food, grains and other things grown or made in India still be high?

10. One reason is that there is more money in India than before. Merchants from Europe have been willing to pay very high prices for the jute, groundnut and cotton which India exports. They were not able to send as much cotton cloth and other goods in exchange for these products as they used to do. Therefore they had to pay money in exchange for the jute and groundnut and cotton; and for this reason great quantities of silver were sent to India and coined into rupees. As there was more money in the country, the prices of all goods in the country naturally rose. Further, when prices are very high in other countries, merchants in India will try to make money by exporting articles from India to those countries. Hence unless export is prohibited, they will buy up Indian goods until the prices for them rise as high as the prices in foreign countries. Even if export is prohibited, many merchants will buy goods, hoping that at some time the Government will change their mind and allow export.

11. For these reasons, it is doubtful whether the prices of food-grains will fall even though we have a good harvest this year.

12. It is true that high prices cause hardship to coolies who are paid in money if they cannot get their wage increased. They also cause hardship to clerks and others who work for a small salary. To lessen this hardship, the Government of India have decided to control the export of food-grains from the country during this year also. Arrangements will be made to see that amply sufficient stocks are kept in this country and to prevent the price of food-grains in India from rising as high as in foreign countries.

13. Last year there was a bad crop and there was not enough food in the country. Hence many ryots too suffered on account of the high price of food-grains as they had to buy food when the crop on their fields withered. But this year the crop has been good. Hence the high price of food-grains will be beneficial to the ryots. They will get a good price for their crop. And they should be able to pay to their coolies a good wage. The Government have appointed a committee to advise them what increase in pay should be given to low-paid Government servants. So the ryots also should consider whether they should not pay a higher wage to their coolies. If they do this the coolies then will be able to buy food even if the price is high.

14. Last year owing to the failure of the harvest there was not enough food in the country and there was danger that it might be impossible to find rice even if you had money to buy it. But this year the harvest is good and there will soon be plenty of food in the country. Further, the harvest in Burma has begun, and it will hereafter be possible to get rice from Burma if ever it is needed.

ECONOMIC NOTES.

AGRICULTURE.

Agricultural Pests.

The Madras Publicity Bureau in a note in the above subject says :—

All agriculturists know the damage caused from time to time by the numerous pests which attack paddy : much less is known of the work done by the Agricultural Department in endeavouring to find a remedy for these pests ; and it is not surprising that indignant correspondents write from time to time to the papers wanting to know what the Agricultural Department is going to do about it and why no instantaneous remedy is provided. These sufferers can hardly be expected to consider how numerous are the pests that attack the different crops which the Agricultural Department is required to protest, how short a time has elapsed since these pests first began to be studied scientifically, or how much patience and ingenuity nature requires of her cross examiners before she will give the information which they are anxious to elicit. Human diseases have been studied uninterruptedly by a special class of scientists in Europe at least, for over three hundred years and we know to our cost how little can yet be done to combat some of the most important and deadly diseases. It is hardly fair to expect the Agricultural Department to find a cure for all the ills that beset our South Indian crops in 20 or even 50 years. It is more interesting and more encouraging to inquire what the Agricultural Department is doing than to find fault with it for what it has not done. The following account of a small experimental operation which is being carried out by the department in a tract in the Godavari delta may help to explain something of the methods which the department employs and the difficulties which it encounters.

2. Two of the commonest paddy pests in the Godavari delta are : the *Spodoptera mauritia* (the paddy swarming caterpillar) and the *Schenobius bipunctifer* the paddy stem-borer),

3. The Agricultural Department are now fairly confident and they know a method by which the first pest can be checked, provided that water is available. The method recommended is the timely flooding of the fields with the use, if possible, of a little kerosene-oil. The caterpillars climb to the top of the blades of paddy and can then be knocked off into the kerosened water by dragging a rope over the field. But with regard to the second pest the

department is doubtful whether any effective method of combating it has yet been discovered, and it holds that further research and experiment is necessary.

4. The second pest, the paddy stem-borer, is a small yellow moth which lays a mass of down-covered eggs on the leaf of the paddy plant. From the egg comes out a minute caterpillar which makes its way down to the case of the ear head bearing shoot and bites its way into it. There it stays, grows and feeds till it has reached its full size when it wraps itself in a silk cocoon and awaits its transformation into the moth. The central ear bearing shoot of plant whose stem is thus hollowed out withers and dies. These characteristic withered shools (Telugu, Usateru ; Tamil, Venkatiri.) are well known to the ryot who with less than his usual acuteness attributes the withering to an unfavourable wind ignoring the caterpillar which is the real culprit.

5. At one time the Agricultural Officers were inclined to recommend light traps to catch the moth of the paddy worm, but experience has shown that though many moths were caught in the traps yet the number was not sufficient to make any appreciable difference to the damage done to the crops. The Government Entomologist has hopes that a really effective trap could be designed if we know what it is in the paddy plant which attracts the moth to it. In the United States of America, two organic chemists after much research were able to discover an essential oil which attracted the cotton boll worm to the cotton plant. The experimental stage has not yet been passed but it seems probable that by means of this oil a high percentage of the boll worm could be dropped and destroyed. But in order to find the attractive principle in paddy it would be necessary to depute an organic chemist to study the paddy plant from this point of view for an indefinite length of time. If this were done, it might be possible sooner or later to discover a substance which would enable us to devise a really effective trap for the paddy stem-borer. But a highly paid officer, time and patience would be needed for the work and there could be no guarantee that success would ultimately be achieved.

6. Meantime the Entomologist is trying to find other simpler and quicker means of combating the pest. For this purpose the Narasapur taluk in the Godavari delta was selected, and a special staff of Agricultural officers was sent to work there under the Entomologist's directions. The instructions of the staff were to spread among the ryots a knowledge of the life history of the paddy swarming caterpillar and the stem-borer to explain and demonstrate the recognized method of checking the swarming caterpillar by flooding and to investigate the best method of combating the stem-borer.

7. It proved impossible to carry out one part of the campaign, because the swarming caterpillar did not appear in any considerable numbers in the tract this year. This is a characteristic example of the difficulties to be faced in dealing with these insect pests. They appear and disappear in such an irregular and unexpected manner that it is difficult for the Entomological officers to be on the spot in time to study the early stages of the pest and it is difficult to be certain whether the appearance or non-appearance of a pest is due to the remedial measures taken or to other natural causes. As this enemy, the swarming caterpillar did not appear the Agricultural officers had to content with orally explaining to the ryots what they should do hereafter when the pest next appears.

8. As regards the part of the campaign which was directed against the stem-borer the Entomologist had no hope of finally defeating the pest in this season. His object was to study experimentally the best means of combating it and by putting the ryots in possession of the facts regarding the life of the caterpillar to secure their co-operation in devising means to destroy it. *Prima facie* the most hopeful methods of attacking the pest were by collecting and destroying the egg masses that are laid on the paddy leaves or by collecting the withered paddy stems in which the caterpillar resides or by destroying the stubble after harvest as at that season the caterpillar finds shelter and nutriment in the stubble. The Government Entomologist knew from his African experience that children in rural tracts might be most useful in a campaign against a pest. They are easily trained to find and recognize a caterpillar or moth or its eggs and they find amusement in the work especially if a small prize is offered for success. The educational authorities were therefore approached. They readily recognized that such a practical training in natural history had a very real educational value, and they agreed to aid in inducing the children in the tract to assist in the collection of the eggs of the moth. A short lesson has now been prepared for use in the rural schools of this tract explaining the life history of the pest.

9. But the experience so far gained in the campaign goes to show that the most hopeful means of checking this pest is by picking out and destroying all attached seedlings at the time when the seedlings are taken from the seed-bed for transplantation. The ordinary coolie is already able to recognize the seedling affected by the pest. Thus by a little extra expenditure on labour the worm infested seedlings could be destroyed while the crop is transplanted. If this were done systematically over a considerable tract, it appears probable that the numbers of the paddy stem-

borer and the damage done to the crop would be appreciably reduced.

10. Another opportunity for checking the pest occurs after the harvest. At that time a generation of the caterpillar is living in the stubble left on the ground, while the daincha which has been sown before the harvest is allowed to grow up. The caterpillar lives either exclusively or at least chiefly in the paddy plant or in its stubble. The month's life is short. Thus if there is no paddy or stubble on the ground for a considerable period, the whole race of the paddy stem-borer or all but a few specimens is likely to perish. The Entomologist therefore advises that the sowing of daincha which is now done before harvest should be postponed and that the stubble should be ploughed in and destroyed. If this were done over a considerable area, it is hard to see how the paddy stem-borer could escape disaster.

11. Accordingly the Agricultural Department now proposes to obtain the permission of a ryot to cultivate on these lines a block of 100 acres in Tanuku taluk in the Godavari delta for a period covering at least three paddy crops. It is hoped that the results obtained will be sufficiently good to warrant the department in recommending these methods for general application in this tract, but time alone can show whether this hope will be fulfilled.

CO-OPERATION.

Co-operative Farming Movement South Africa.

The Federated Farmers' Co-operative Association, of South Africa, recently established, embraces 25 co-operative societies in the Union and Rhodesia, has a membership of 35,000 to 40,000, and represents a capital of £1,750,000.

SCOPE AND OBJECTS OF THE ASSOCIATION.

The Association is interested in practically all farming activities, including, states the "Cape Times," maize, wool, wattle bark, hides and skins, butter and cheese making, meat, wine and tobacco.

Its London office is working in conjunction with the New Zealand Farmers' Co-operative Association. Branches have been established in Paris and Rotterdam, and an office is to be opened in New York.

In addition to finding the best markets for South African products, overseas representatives will buy agricultural implements, machinery, and fertilisers for Association members, according to their needs.

ORGANISATION.

In the course of a conference lately held at Bloemfontein it was decided that, after individual farmers had been organised into co-operative societies, these in turn should be linked up through central committees, preferably, but not necessarily, on a provincial basis, the final step being to link up the central companies into one federal organisation.

The conference decided to insist upon the following in the articles of association of any co-operative company:—(a) Dividends must not exceed 10 per cent; (b) shareholders must be farmers; (c) transfer of shares must be controlled; (d) no shareholder should have more than one vote; (e) all transactions to be on a cash basis.

ELIMINATION OF MIDDLEMEN.

One of the objects of the Association is the elimination of the middleman and his profits, both in buying and in selling, states the Johannesburg "Star." Manufacturers are said to have hitherto refused to supply individual co-operative societies, and this has influenced to an important degree the federation movement.

FUNCTION OF OVERSEERS OFFICES.

The overseas offices will provide the link between the producer, represented by the Association and its constituent societies, and the consumer. They will find out where a demand exists for any particular product and will cable the Association with advice as to the prices obtainable. The Association will disseminate the information among its constituent companies, ascertain quantities available, and cable offers, upon which contracts will be entered into.

IMPORTANCE OF QUALITY.

The necessity for a high standard of quality of products sold through the medium of the Association has been fully realised. Responsible officers will undertake examinations of all produce before shipment, and nothing but first-grade will bear the registered stamp of the Federated Association, which is "Fedfarms."

EDUCATION.

Education in Bihar.

The following resolution was published in a recent issue of the *Bihar and Orissa Gazette*:—

The most important features of the year 1918-19 so far as the Education Department was concerned were the continuance of the financial conditions caused by the war, and the widespread epidemic of influenza which combined with severe local outbreaks of cholera and the abnormal and sustained rise in prices caused a set-back to the progress of primary education which, it was hoped, had at last definitely begun.

2. Mr. G. E. Fawcus, M.A., held charge of the department throughout the year. The depleted cadre of the Indian Educational Service received some much needed strengthening by the return of most of those officers who had been absent on military service; at the close of the year only three members of the service still remained on military duty, of whom two have since returned. His Honour in Council notes with pleasure that Mr. McCombe was awarded the Military Cross for distinguished service in Palestine. One post was added to the cadre to provide for the appointment of a Registrar of Examinations, Secretary to the Text Book Committee and Inspector of European Schools, and proposals were formulated for the addition of one more permanent and five temporary posts. These have since received the sanction of the Secretary of State.

3. *The Provincial and lower services.*—Although it was still impossible to make much headway with the reorganization of the Subordinate Educational Service, considerable improvement was made in the promotion open to certain classes of that service by the transfer of thirty-six posts reserved for the headmasters of Government High Schools and for district inspectors to the Provincial Educational Service. The recruitment for these posts will normally be made from the ranks of the junior service. The strength of the latter was also considerably increased, chiefly by the completion of the scheme for the replacement of inspecting pandits by sub-inspectors of schools.

4. *The University.*—With the constitution of the first faculties, the formation of boards of studies and the framing of the curricula, a considerable advance was made in the organization of the University. Although the number of candidates for the University examinations shows some decrease, this should not be taken

as denoting a lack of progress, since the figures for 1917-18 must be considered as abnormal. The results of the latest examinations, which showed a somewhat lower percentage of successes, are mainly remarkable as emphasizing the intention of the University to insist on maintaining a high standard from the outset. At the same time they indicate the necessity of improvement in collegiate teaching and to this the inspections of the external colleges, which were carried out for the first time by the University Inspectors, and have been very valuable in bringing to light their weaknesses, should greatly contribute.

Considerable progress was made in the preparation of the plans for the University buildings. Professor Jackson and Dr. Caldwell were placed on special duty towards the end of the year and the preliminary plans for the training college and the science buildings were outlined by March 31st. Rapid progress was made subsequently, but it has become necessary to reconsider the scheme in the light of the report of the Calcutta University Commission, whose proposals for the exclusion of intermediate classes from universities, the extension of the B. A. and B. Sc. courses to three years and the concentration of teaching at Dacca in the central buildings would, if adopted at Patna, materially affect the designs of the Patna buildings. A committee has just been appointed to consider these questions and it is hoped that this review of the findings of the Nathan Committee will not cause any serious delay.

5 *Arts Colleges*.—The increase in the strength of the colleges which marked the institution of the University has been maintained and the roll of students rose from 2,811 to 2,914. This steady growth in numbers has caused embarrassment in some colleges and the University Inspectors have called attention in more than one case to overcrowded classes and recommended a stricter limitation of numbers in the interests alike of efficiency and of health. The scheme for the establishment of additional honours and postgraduate classes at Patna College mentioned in last years' resolution, has now received sanction and, since the close of the year, has been brought partly into operation. In order to make room for this teaching, the I. A. classes have been transferred to the Patna Collegiate School and an early experiment is thus being made with one of the main recommendations of the Calcutta University Commission.

The plans for the new buildings for the Ravenshaw; Tej Narayan Jubilee and Greer Bhumihar Brahman Colleges were practically completed during the year and Government hope that the work of construction will be well advanced by the end of the current year.

6. *Secondary education*.—Although the increase

of pupils was comparatively small, the number of high schools for boys rose from 106 to 114, that of middle English schools from 234 to 232 and the total number of secondary schools from 497 to 525. The advance, which in the case of high schools is the largest recorded in any year since the formation of the Province, shows clearly that the external influences which so easily cause fluctuations in the progress of primary education do not affect the more advanced schools. Courses of study were framed for the school-leaving certificate examination sanctioned in the previous year, but the great majority of schools, including those under direct control, have not yet been able to avail themselves of the benefit of the wide choice of subject permitted by the new system. The difficulty is partly one of providing qualified staff but is mainly a question of finance. A scheme is being prepared for the gradual introduction of new kinds of teaching into Government schools, as funds permit, and the Lieutenant-Governor in Council trusts that this example will be followed by all aided and non-aided institutions. The influence which a wider school syllabus would have on the commercial and industrial development of India, to which all are looking forward, is now generally recognized and His Honour in Council appeals, to all concerned, to do their best to take advantage of the opportunities now offered.

The cessation of hostilities and the consequent relaxation of the embargo on capital expenditure rendered it possible to commence work on a number of long-delayed building schemes for high schools, and the plans of several new buildings for Government schools are now under examination. The transfer of middle English schools from the control of local bodies to that of Government was completed and since the beginning of the year 1919 local bodies have been free to concentrate their attention on the expansion of primary education.

7. *Primary education*.—In commenting on the absence of any increase in the number of primary schools in 1917-18, Government expressed the hope that the turning point in the development of primary education had been reached, but the combination of untoward circumstance which marked the year 1918-19 has again falsified their anticipation. Although there was a very considerable increase in the funds placed at the disposal of local bodies for primary education, the number of schools fell from 25,827 to 25,652 and the number of pupils from 711,716 to 695,259. The decrease took place entirely among the lower primary schools, since the number of upper primary schools, which as the Director of Public Instruction points out are more stable, owing to their having more than one teacher and a larger fee income, rose from 1,732 to 1,816 and that of their

pupils from 92,880 to 94,422. It is noteworthy also that, although each district shows different results, the aggregate number of managed, aided and stipendiary schools shows an increase and it is only among the unaided class that there is a net falling off. Such schools at best possess little financial stability or assured income while in many cases they are the private venture of a totally unqualified man. They and in a less degree the stipendiary schools are peculiarly susceptible to the influence of variations in economic conditions which leave the more stable institutions untouched while in a widespread epidemic, such as occurred last year, teacher and school perish together.

This constant failure to record adequate progress in elementary education in spite of an increase in expenditure of over 60 per cent since the province was founded continues to cause the Lieutenant-Governor in Council much concern. Careful inquiries were made throughout the province during the latter half of 1918 and a variety of causes were reported as contributing to the present state of stagnation. Chief among these were the lack of appreciation among parents of the benefits of education, their unwillingness or inability to pay fees or to spare their children from agricultural operations, the want of a second teacher in most schools and the quickness with which boys leaving school at an early age lose from lack of practice what little knowledge they may have acquired. These and other causes are receiving careful attention during the examination of the programmes for the expansion of primary education in each district, which is now in progress. Further detailed inquiries will be made during the current cold weather in a number of typical villages throughout the province, in order to ascertain the relative importance of the various influences to which lack of progress has been ascribed. In the meanwhile, as Mr. Fawcus points out, one of the most obvious and pressing reforms is the substitution of the grant-in-aid for the stipendiary system. Under the grant-in-aid rules which are already in successful operation in those areas where Christian Missions are in existence, the money at present paid personally to a certain *guru* by the District Board is given a grant-in-aid to a committee or institution on condition that a teacher or teachers with certain qualifications are maintained. The school is controlled either by a central committee or by the local residents and does not depend for its existence and well-being on the good or bad health, or the personal idiosyncracies of one individual, whose work can be inspected by outside authority at most, but twice or thrice a year. The Lieutenant-Governor in Council has repeatedly recommended local bodies to give a more extended trial to this system and trusts that in those areas where they do

not exist a definite number of aided schools will be started this year.

Programmes for the expansion of primary education were prepared for all districts, but it was found that they needed considerable alteration and co-ordination. Orders were given for their revision; and amended programmes have now been received and are under examination. The schemes involve not only a considerable increase in the number of schools, but a very much greater expansion in the number of teachers generally, and of trained teachers in particular, accompanied by an improvement in their conditions of service. Measures have already been taken to increase largely the output of trained teachers from *Guru* training schools in preparation for this development, but the financial problems involved are at present incapable of solution.

The Lieutenant-Governor in Council is compelled again to call attention to the delay which still occurs in the payment of stipends. These delays have more than once been the subject of adverse comment; it should not be necessary to dwell on the importance of punctuality in this matter, but it appears that the instructions issued in 1916 are still very imperfectly followed, especially in the Chota Nagpur districts.

8. *Female education*.—During the previous year or two no appreciable progress had been made in the development of female education, and it is therefore the more pleasing to observe the satisfactory increase in all classes of girls' schools in 1917-18 in spite of the adverse circumstances of the year. The number of schools rose from 2,586 to 2,634 and that of the pupils from 60,968 to 62,163. The progress was particularly marked in the case of middle vernacular schools which rose from 11 to 16. Another point worthy of comment was the very marked increase in the number of middle, upper and lower primary scholarships won by girls under the operation of the new scholarship rules.

9. *Mohamadan and Sanskrit education*.—The new curricula for Madrasas and maktabas which were framed on the basis of the deliberations of the Committee for Mohamadan Education in the year 1914 were introduced during the year, but a number of madrasas still adhere to their own courses. The numbers attending both Mohamadan and Sanskrit institutions shared in the decline which has been noted in the case of unaided primary schools. Several important developments in Sanskrit education took place during the year. The provincialization of the Puri Sanskrit College has provided the province with a second Government Sanskrit College; provincial expenditure on Sanskrit education has risen from Rs. 24,775 to Rs. 32,889; while it is hoped that a great improvement in the standard of

schools will result from the appointment of a Superintendent and Assistant Superintendent of Sanskrit studies.

10. *Technical and Industrial education.*—The publication of the report of the Indian Industrial Commission was an important event of the year. The Commission recorded their opinion on more than one of the schemes for technical education now under consideration. Revise-projects for the improvement of the Bihar School of Engineering and the foundation of a school of engineering at Cuttack have since been submitted to the Government of India, while negotiations for the starting of aided technical schools at Jamalpur and Jamshedpur are in progress. The scheme for the establishment of a school of mines in the coal area, which was approved by the commission, is being revised by the Mining Education Advisory Board.

11. The thanks of the Lieutenant Governor in Council are due to Mr. Fawcus for his efficient administration of the department in his charge and to the officers under him who undertook increased work and responsibility during the war.

INDUSTRIES AND COMMERCE.

Industrial Progress in the United Province.

The following are extracts from the Resolution of the Local Government on the Report of the Director of Industries, United Provinces, for 1918-19 published in the *United Provinces Gazette* of January 24, 1920 :—

In his report the Director of Industries has given an interesting review of the position of those growing industries of the province to which this department can be of most assistance.

In the glass industry manufacturers had a very successful year. Their trade reached considerable dimensions under the stress of war conditions, but the Director emphasises the fact that if the trade which has been captured is to be permanently secured and increased, their methods, both of business and manufacture, must be improved on scientific lines. As in the case of many other trades, the business organization of the glass industry is defective. This applies both to the larger glass factories and to the subsidiary factories like those of the bangle-makers of Firozabad. Special measures appear to be necessary to establish trade connections,

such as the employment of travelling agents for securing orders by personal interview. In this respect the Department of Industries can give but little assistance.

Government is fully alive to the necessity of securing technical advice as to plant and processes of manufacture. Mr. Elland's resignation at this time has been a great loss to the industry, but steps are being taken to recruit a glass specialist. The services of four English glass-blowers were secured during the year for the Allahabad Glass Works to facilitate the training of good workmen. The Director reports that a number of Indian workmen have been trained with their help, that workmanship has much improved, and that the output of the factory has been doubled during the twelve months.

The metal-ware industry has also done well, but here again expert guidance is urgently necessary. With better craftsmanship in the preparation of pressing tools, the making of lamp parts and other similar articles of pressed metal-ware would have excellent prospects as a cottage industry. The services of Mr. Roodhouse, the metal-pressing expert have been dispensed with, but it has not yet been found possible to recruit in his place a diesinker and press tool-maker. It is perhaps not clearly recognized how difficult it is both to obtain and retain the services of the experienced craftsmen who are so urgently needed for the profitable development of these minor industries.

Another small industry which requires more expert assistance is the fruit industry in Kumaun. Capital and enterprise are not wanting and good pioneer work has been done at the Kumaun Government Gardens in the way of scientific grading fruit-bottling and jam-making. It is hoped that an orcharding expert may shortly be appointed with a view to bringing home to the smaller fruit-grower the possibilities of this trade.

The development of chemical industries within the province is limited by the absence of some of the more important raw materials; but the department through its Industrial Chemist has been able to give considerable assistance. The Director of Industries records his appreciation of the integrity and intelligence displayed by Mr. J. P. Srivastava, who, as Industrial Chemist, controlled the technical laboratory for the whole year and also had charge of the experimental Soda Factory and of the Dyeing School. The industrial laboratory carried out a large number of enquiries both on behalf of Government and for private firms. Its usefulness is established and will be enhanced when it is possible to provide the chemist with a fully-equipped industrial laboratory in permanent quarters. The department spent a considerable sum on the investigation of the

production of alkali from *reh*, manufacture of which could be successfully undertaken if conditions for the collection of the raw material were available. During the course of the year the Government Soda Factory was sold to a private firm, but all the technical work connected with the factory was carried out in the department's laboratory.

It is in the laboratory that Government can give most assistance to the essential oil industry of Kanauj and elsewhere. This is reported by the Director to be in a flourishing condition, although it is being worked on primitive lines. The Industrial Chemist completed his work on the distillation of clove oil and carried on an exhaustive series of experiments on the distillation of rose and patchouli.

Mr. Srivastava continued his work in connection with dyes, tanning and sizing material. He also records very encouraging results from work on the preparation of printing-inks and speaks hopefully of his enquiries into the possibility of starting a varnish and paints industry.

During the year of report the industrial laboratory was also utilized in investigation on behalf of the Indian Munitions Board.

Mention may here be made of the success of the Dyeing and Printing School at Cawnpore, which during the period of report was in charge of Mr. Srivastava and has now been transferred to Mr. S. M. Yusuf, also a technical scholar. The school has undoubtedly become popular. It attracts students from many parts of India, although a fee of Rs. 20 a month is charged from all who are not residents of the United Provinces. There has been no lack of employment for students trained at the school which has an excellent future before it.

A large section of the Director's report is devoted to the weaving industry. Handloom-weavers took advantage of the rise in price of cloth and shortage of stocks in India, and there has been a marked increase in the number of new sheds started in villages, while a real advance appears to have been made in the use of the fly-shuttle loom. The hosiery trade, however, although almost equally promising as a cottage industry, was seriously handicapped during the year through difficulties in obtaining machines and needles.

The Department of Industries can help handloom-weavers in three ways—by facilitating the supply of material, by organizing the disposal of the product, and by educating the workers in improved methods.

The success of the Central Supplies Stores of Benares is particularly gratifying. Its sales of yarn and other stores of weavers have increased from Rs. 25,000 in the previous year to Rs. 57,000. A branch has been opened in the city of Benares, and in addition to supplying materials the Stores act as

selling agents for the disposal of cloth and hosiery. Similar assistance was given, though on a very limited scale during the year under report, to the lace and embroidery trade by the Central Emporium at Cawnpore. This Emporium has now been transferred to Lucknow and has been put under the direct charge of the Principal of the School of Arts and Crafts. The transfer has met with considerable success and it is hoped that it will have the result of securing not only the local but also the much larger foreign market for silks, satins, embroideries, and art-work of all kinds. In all these small trades production is now on a limited scale owing to the inability of the producer to get into touch with the foreign dealer and to take advantage of the very real demand which exists for the Indian products of this kind.

These Government institutions cannot, however, perform the whole work of organizing the trades to find their market. A great deal must be left to the producers themselves and much is expected from the development of co-operative effort. With this object in view the Lieutenant-Governor proposes to add to the administrative staff of the Co-operative department, as funds admit, officers who are specially qualified to encourage Co-operative work among the weavers and in other trades.

The chief factor, however, in the development of the weaving industry in this province must, as in all cases, be education, and His Honour notes with special satisfaction the success of the established weaving schools and the activity of the Department of Industries in organizing peripatetic instruction which, especially if allied to the co-operative movement, can more effectively get into touch with the weavers themselves than is possible if effort is limited to the foundation of fixed schools. The Central Weaving Institute of Benares, for example, still fails to attract local Julahas and most of the students come from other districts. The construction of a hostel here will greatly increase the numbers. The scope of the Institute, however, goes far beyond the limited requirements of training of handloom-weavers and its success cannot, as must be the case with the smaller schools, be measured merely by its local effect. The smaller weaving schools at Bara Banki, Shahjahanpur, Moradabad, and Sandila show satisfactory attendance and are doing good work in popularizing the fly-shuttle loom. The schools at Etawah and Budaun were originally peripatetic, but are now fixed. Each gives a short term of instruction and in each case the school is proving popular, and most of the passed students are now reported to be working at their homes on shuttle looms. The record of the peripatetic schools has been interesting. One school was opened at

Sabaswan, but the difficulty in the supply of yarn has discouraged the local weaving trade and the school had to be transferred to Meerut. The Agra school has failed to attract weavers and will be moved elsewhere. The school in Etawah district has been successful and the school at Mau remarkably so. At the end of March, 1919, over 400 fly-shuttle looms were working in the neighbourhood of Mau. Some are worked by students trained at the school; for the most part the workers are self-taught, but are assisted by periodical instruction given by the school mistry. The total cost of the Mau school for the year under report was only Rs. 1,328.

The blanket-making school at Muzaffarnagar did good work and a suggestion is being considered to extend its scope to the weaving of tweed cloth. The Hosiery school at Almora and the school of needlework at Lucknow did not have a very successful year. The former was hampered by difficulties in securing machines, needles, and yarn: the development of the latter is checked by difficulties in marketing the product. Here also co-operative effort must be encouraged.

Another industry which in its different phases depends very largely for its improvement on peripatetic instruction and on co-operative work is the leather industry. It is largely by these means that any real advance can be made in overcoming by work among the Chamars, the initial difficulty of the faulty flaying of hides. The appointment of a junior assistant register in the co-operative department for this special work has been approved.

Most branches of the leather trade have prospered under war conditions. The bazar trade in leather buttons appears to be established. The leather-working school at Cawnpore has done well.

The Allahabad Carpentry School was opened on the 1st April, 1919. Proposals for the enlargement of the school are being considered. The opening of the school together with the development of the Wood-working Institute, Bareilly, should have an important effect on the progress of all branches of the timber and wood-working trades both as regards the training of employers and workmen and the supply of good material in suitable form.

The progress of the School of Arts and Crafts, Lucknow, has been hindered by the rise in prices of material. The practical effect of this school should be greatly increased by its being brought into closer touch through the Emporium with local Art industries such as the brass and metal industries of Lucknow, Benares, and Moradabad, the cloth-printing industry of Farrukhabad, and the satin industry of Azamgarh. Much useful work has already been

done since the transfer of the Emporium to the school. An exceptional opportunity for progress will be given to the Art industries by the opening in the United Kingdom of a British Industries Fair, which the Principal of the school has been deputed to attend.

SUGAR-CANE CULTIVATION.

The following in the English version of a leaflet on the cultivation of sugar-cane in North and South Arcot and the neighbouring districts, prepared by Mr. J. Chelvarangaraju Garu, Deputy Director of Agriculture, St. Thomas Mount. Tamil and Telugu versions of the leaflet are about to be issued by the Agricultural Department and will be distributed gratis. Land-owners who desire to get a copy of the leaflet in English, Tamil or Telugu, may apply to the Publicity Bureau, Victoria Buildings, Commander-in-Chief Road Egmore, Madras.

HOW THE RYOTS CULTIVATE SUGAR-CANE.

In cultivating sugar-cane, ryots in different villages follow different methods. Before giving advice as to the best method to be followed, it will be well to describe the methods now used by the ryots. The land selected is usually a wet land in the ayacut of a tank or channel which gives a good supply of water, but in Nellikuppam ryots have recently begun to grow sugar-cane in dry lands irrigated by a well. In some villages in preparing the land for sugar-cane cultivation the soil is ploughed wet and the sugar-cane sets are planted in lines from 1 to 1½ ft. apart. In other villages, the ryots plough the soil dry after the harvest of paddy. When the soil has been thoroughly ploughed, the field is divided into small ridges and furrows at a distance of 1½ feet apart. The ridges are first made with a country plough and later are shaped with mamootics, and the sugarcane sets are then planted in the furrows close together. In some villages, beds of convenient size are formed and in each bed half a dozen short furrows are made and the sets are planted in the furrows. In other villages the land is broken up with a crowbar and large lumps of earth are heaped into rough ridges and furrows and sets are planted in the furrows thus made. In other villages, trenches of 1 foot wide and 1 foot deep are dug at distances of 3 or 3½ ft. from the centre of one trench is the another. The sets

are then planted in the trenches so close that they almost touch each other.

For manuring some ryots pen sheep and apply cattle manure to their fields. In addition they put on it large quantities of pungam leaves and flowers when the canes are beginning to grow. They also soak pungam aake and cattle dung in a pit for about a week. They then let water flow through the pit to the sugarcane crop. In other villages the ryots give oil cakes (ground nut, castor or pungam) both when they plant the sets and subsequently from time to time till the fifth month.

For sugar-cane sets, some ryots use only the top of the shoot, and others cut the whole cane into sets and use all of it. Some ryots plant about 9,000 sets per acre, while others plant as many as 30,000. Where the irrigation is uncertain, the ryots use the cane known as 'Nanal' which takes about 8 to 9 months to grow ripe. In other places the cane most grown is the 'Namam' which is also called Rasthali, Namalu, Dasari or Izar. Near Nellikuppam, the new varieties of cane introduced by the Agricultural department, such as Mauritius cane, Java cane, Barbados cane and Fiji cane are grown instead of the local canes, as they are found more profitable.

Some ryots support canes by bamboos, wrapping them at random, and other ryots do not trouble themselves to do this.

RECOMMENDATIONS,

As the soil and irrigation facilities are different in different places, it is not possible to recommend a single method of cultivation as suitable for all lands. But those who wish to make a profit by growing sugar-cane should remember the following general principles.

How to choose the land. The most important thing is to select a suitable land. Sugar-cane requires plenty of irrigation. It also requires rich soil or much manure. For this reason ryots are apt to choose the best wet land or heavy loomy soil for growing the crop. When they do so, they do not consider sufficiently whether the land can be properly drained. From the best wet lands and heavy soils water cannot be easily drained off. On the other hand in light sandy soils from which water can easily be drained, the cost of manuring will be heavy, and the crops may suffer soon from lack of water. However, we must remember that though sugar-cane requires plenty of irrigation, it cannot thrive in badly drained. If immediately after we have planted the sugar-cane sets, a badly drained soil gets soaked owing to irrigation or heavy rainfall, the sets will rot without sprouting. We often see that in badly drained heavy soils the leaves of the sugar-cane turn yellow and sickly. This is because

the air cannot reach the roots of the sugar-cane. If the roots were to go down deep into the cold wet layers of the soil, the air and the warmth could not reach them. For this reason the roots will spread along the surface without entering deep into the soil. When the roots do not enter deep, the canes, when they grow up are easily blown down by the wind in the monsoon time. The fallen canes contain very little sugar. If these fallen canes are crushed with other canes, all the jaggery will be spoiled. There will be a great loss to the cultivator. Further canes grown in heavy wet, ill-drained soils are apt to be attacked by diseases like red-rot. Hence in selecting the land for sugar-cane we must remember 3 things (1) The land must be fertile. (2) It must also be easily irrigated. (3) Lastly, it must be possible to drain the water away from it easily.

DRAINAGE.

Even if the soil can easily be drained, it is necessary to take precautions to ensure that neither rain water nor irrigation water should be allowed to rise above the surface of the soil. If the soil is stiff and heavy, deep trenches must be dug between the canes, so that water may quickly be carried away. For this reason it will be necessary to plant sugar-cane in rows. Though the ryots do this in many villages, yet they often fail to make arrangements to carry away the drainage water. In many villages the ryots plant the rows so close together that it is not possible to dig drains between them to take away the water. The rows should therefore be 3 or 4 feet apart from centre to centre instead of 1 foot is $1\frac{1}{2}$ feet. In most villages ryots use the channels toap for irrigation to drain away the water. dugdr channels are shallow the irrigation water. As these over the surface especially during the rains and prevents the canes from growing properly. Care should be taken to dig the drains so deep that the irrigation water let into them will not come within a foot of the top of the ridge after the crop has been earthed up. If this is done, there will be no damage to the crop.

If suitable manure is given in proper quantities, this will be beneficial to the sugar-canes. If we plough green manure crop into the soil, this will not only provide food for the sugar-cane but it will also improve the soil. If green manure has been ploughed in, water will drain through the soil more easily and the roots of the sugar-cane also will penetrate into the soil more readily. When the land is being prepared for cultivation, many ryots pen sheep or apply cattle manure. If night soil manure is put on the land this also will be useful. It is certain that the land must be manured before sets are planted, so that they may grow up well. But we

ought not to put all the manure which the crop requires into the soil in one lump at the start. Instead of this, it is better to give manure little by little at intervals as the crop grows. We should manure for the second time $1\frac{1}{2}$ months or 2 months after sets are planted. We should manure the crop for the third time in the third or fourth month, just before we earth up canes for the last time. About 3 or $3\frac{1}{2}$ candies of oil cake (castor, groundnut or pungam) or fish manure will usually be sufficient for one acre. If green leaves like kulinji, pungam and indigo are available, they can be used before we earth up the plants. The ryots of Chittoor and South Arcot do this.

WHAT SETS TO USE.

We do not sow seeds of sugar-cane; instead, we plant the cuttings taken from old sugar-cane plants. The top portion of the cane sprouts best. Therefore we should use only the top portion for sets. In selecting sets for planting, we should take only the healthy plants which are not stained with a red colour. The best thing to do is to select healthy plants before sugar-canes are cut and then to cut these plants in the fields for sets.

WHAT VARIETIES OF CANE TO CHOOSE.

In choosing the variety of cane to be planted, we should remember that it is not safe to plant only one single variety over a large area. If we do this, it will not be possible to crush all the canes as soon as they become ripe. If canes are left in the field after they become ripe, they lose part of their juice and there will be a loss to the ryots. Therefore we should select different varieties of sugar-cane for different fields. Then the canes in some fields will ripen early, while the canes in other fields will ripen. It will then be possible to crush all the canes as soon as they become ripe, and there will be no loss. We find that the new canes Fiji B and B 208 stand a little longer than other varieties without becoming spoiled. The canes called B-1529 and J-247 ripen a month earlier than others. Red Mauritius cane and the cane called B-147 both get ripe a little later than B-1529 and J-247, but earlier than the canes called Fili B and B 208.

HOW TO PLANT THE SETS.

It has already been said that while some ryots plant only 9,000 sets per acre, others plant as many as 30,000. In this matter the ryots of Chittoor and North Arcot districts act unwisely. If too many sets are planted, the plants have no sufficient room; therefore they will not send out many shoots. At the same time about 20 per cent of the sets die soon after sprouting. Besides this the canes do not grow uniformly either in thickness or in height. Thus there is a great loss to the ryots who plant too many

sets for an acre. In Chittoor district 1,000 sets of one cubit long cost as much as 80 lbs. of jaggery at harvest time. If we plant in rows 3 ft. apart, there will be a saving of Rs. 70 an acre in the number of sets used. Some ryots near Madanapalli have adopted this practice and are now using only 10,000 sets an acre, while formerly they used 30,000 sets. They call the new planting system "circular totta." Remember therefore that you should plant your canes in rows at a distance of 3 ft. apart and that you should not use more than 10,000 sets in an acre.

HOW TO CULTIVATE AFTER PLANTING.

We must hoe the ground repeatedly so as to keep the field clean of weeds and to make the surface soil loose. If this is done, young roots will spread easily and take up nourishment and the canes will grow large. Whenever we irrigate the land, we must take care that the water does not rise above the level of the furrows from which water flows. In Chittoor district the ryots twist the lower leaves of the sugar cane as soon as they begin to become old and tie them round the stem of the cane as the canes grow. This is done partly to prevent the jackals from biting the canes and partly to make the cane grow taller. In some places they tie the canes to bamboos as a support. This is necessary when the canes are planted in shallow furrows or when the soil is not sufficiently drained. In such places the roots of the cane do not go down deep. It is therefore necessary to support the canes. But to wrap the leaves round the cane or to support the cane with bamboos is very costly. To save this expense, in Nellikuppam the ryots plant improved varieties of cane which are so hard that the jackals cannot bite them. Then it is no longer necessary to wrap the leaves round the cane. Further near Nellikuppam they plough the land deep, they drain the land thoroughly and they plant the canes far apart. The result is that the roots of the canes go deep into the soil and the plants send out many shoots. Thus they support each other without the help of bamboos.

ADVANTAGE IN GROWING NEW VARIETIES.

The new varieties called B-208 and Fiji B are short and stout and produce plenty of side shoots. The java canes are stronger canes and are able to stand against the wind better. These varieties give a better yield of jaggery than the local canes Nanal and Namam; and they are less often attacked by disease. If the ryot grows these varieties, he will get better yields; at the same time the cost of cultivation will be less, as bamboos to support cane will not be necessary.

HOW TO CUT THE CANE.

It is well to irrigate the field freely before cutting

the cane for crushing, as this improves the quality of the jaggery. If this is done, the quality of the jaggery will be improved. Ryots now cut the cane 4 or 5 inches from the ground, leaving the stump in the ground; but the stump of the cane contains the largest proportion of juice. Hence this practice is wasteful. To prevent this waste we should cut the cane at the surface of the soil with a heavy knife or mamooty.

HOW TO BOIL THE JAGGERY.

The best methods of preparing jaggery are described in the Agricultural Department leaflet No. 22. A copy of this leaflet can be obtained by writing to the Publicity Officer, Victoria Buildings, Cammader-in-Chief Road, Egmore, Madras. In Chittoor and North Arcot districts the ryots use a furnace similar to the one recommended in that leaflet. Nevertheless, they still find it necessary to use a great quantity of fuel. About 10 tons of fuel in addition to the refuse of the cane is used for manufacturing the jaggery that is obtained from one acre. This is because the ryots use pans made of thick iron sheets. The pan used for manufacturing 35 lbs. of jaggery weighs nearly 300 or 400 lbs. If the ryots use pans made of thinner sheets, they can save 6 or 7 tons of fuel in the manufacture of jaggery for each acre.

MYSORE ECONOMIC CONFERENCE. EDUCATION COMMITTEE.

The following is a brief report of the work done by the Education Committee during the half year ending 31st December, 1919 :—

1. During the period under report, the following schemes engaged the attention of the Committee :—

1. Adult Education.
2. Recreation and Play-grounds.
3. Improvement of the Physical Culture Institute.
4. Experimental Boarding Home.
5. Publication of Text-books on Heroes.
6. Religious and Moral Instruction.
7. Improvement of Museums.
8. Institution of an efficiency examination in education service.
9. The Memorandum issued by Government on Education in Mysore.

10. Education of Panchamas.
11. Introduction of Military training in High Schools.
12. Preparation of Science Readers in Kannada.

II. Experimental Work.—

PHYSICAL CULTURE INSTITUTE.

This was sanctioned by Government and started work in January 1919, and two batches of pupils numbering 140 and 120 respectively had finished training by June 1919. A third batch consisting of 150 pupils is now receiving instruction in the Institute. It is highly gratifying to note that the Institute has become exceedingly popular and several pupils had to be rejected admission for want of sufficient accommodation. The Instructor, Mr. M. V. Krishna Rao, organized tournaments in Indian games and wrestling at Mysore during the Birthday and Dasara seasons of 1919 and also gave demonstrations of physical strength on the latter occasion which were greatly appreciated.

Proposals have been submitted to Government for making the Institute permanent. A suitable building for the students to take exercise, with a large playground attached to it is urgently needed. It will then be possible to make the institution self-supporting by organizing periodical wrestling matches under its supervision which will bring in a large income to the Institute.

In order to know that the system of training given in the Institute is in no way injurious to the pupils, a medical inspection (both before and after training) of the students of the Institute has been sanctioned and after the examination is complete, the expert medical opinion will be placed before the Board and public.

III. Publications—

- (i) Mr. Ramakrishna Rao's lecture on 50 years' progress in Mysore.
- (ii) Schools of Public Life.
- (iii) Kannada translation of Courses and Careers for Mysoreans.
- (iv) The saving of waste is the beginning of a new prosperity in Kannada, a lecture by Mr. Mallappa (in the press).

IV. Dasara Activities.—

In addition to the tournaments in Indian games and wrestling referred to above, the following public lectures were delivered under the auspices of the Education Committee :—

Lecturer	Subject	Chairman
J. C. Rollo, Esq., M.A. ...	A University for Mysore ...	Rajamantrapravina H. V. Nanjundiah, Esq., M.A., M.L., etc.
R. H. Campbell, Esq., I.C.S. ...	Cashmere ...	Mir Humza Hussain, Esq., B.A., B.L.
Rajakaryaprasaktha B. Ramakrishna Rao, Esq. ...	Education and Religion ...	K. S. Chandrasekhara Iyer, Esq., B.A., B.L.
S. G. Sastri, Esq., B.A., M.Sc. ...	Cotton seed oil ...	V. Rangaswamiengar, Esq., A.C.E., B.C.E.
Dr. M. C. Nanjunda Rao B.A., M.B., C.M. ...	Pilgrimages in Northern India.	Rajamantrapravina H. V. Nanjundiah, Esq., M.A., M.L.

N. B.—This was a heavy and important item of the work during the half year and it formed the subject of discussion at two consecutive meetings, one on the 25th November and the other on the 9th and 10th of December last.

Mr. Campbell's lecture was illustrated with lantern slides.

V. Sub-Committees, their meeting and the subjects discussed by them.—

Three new special Sub-Committees were formed during the half-year to consider the subjects of.

- (1) Separate text-books for the use of Adults' Schools.
- (2) Preparing suitable text-books for Religious and Moral Instruction in schools, and
- (3) Sanitary Education.

The details of the business transacted by the several Sub-Committees during the period are as follows :—

Date of meeting	Name of the Sub-Committee	Subjects discussed
21st October 1919 ...	Special Sub-Committee No. 1 above ...	Separate text-books for the education of adults.
1st November 1919 ...	Science Education ...	(i) Introduction of Elementary Science into the curriculum of A. V. Schools. (ii) Lecturing in Kannada by Science Graduates employed in the University and the Education Department.
20th November 1919 ...	Industrial Education ...	(i) Imparting instruction in a large number of subjects in the Chamarajendra Technical Institute, Mysore. (ii) Transfer of all Technical institutions except the Mechanical Engineering School and the Chamarajendra Technical Institute, to the Director of Industries and Commerce.
29th November 1919 ...	Special Sub-Committee ...	Patronising and purchasing the copy right of 5 volumes of science readers in Kannada written by Bernard and Joseph of the C. and M. Station Bangalore.

VI. Notes, etc., prepared by the individual Members.—

Mir Humza Hussain, Esq., B.A., B.L. (Chairman) ...

Dr. M. Srinivasa Rao, M.A., M.D. ...

K. Chandy, Esq., B.A. ...

1. Religious and Moral Instruction in Mysore.
2. Experimental Boarding Home.
- Improvement of Museums.
1. Play-grounds.
2. Memorandum on Education.

D. G. Dani, Esq., B.Sc., F.C.H.	...	...	Improvement of Manual Training.
Rev. Father Tabard, M.A.	...	...	Censorship of Dramas and Cinemas.
C. R. Reddy, Esq., M.A.	...	...	{ 1. Reorganization of Practical Instruction Classes. 2. Adult Education. 3. Education service proficiency examination. 4. Publication of books.
V. Subrahmanya Iyer, Esq., B.A.	...	...	{ 1. Improvement of inspection of High School. 2. Memorandum on Education.
K. Srinarasimhaiya, Esq., M.A., L.T. (Secretary)	...	...	{ 1. Memorandum on Education. 2. High School Teachers' Association.

PROGRESS IN THE DISTRICT.

Shimoga.

AGRICULTURE.

Cattle Show at Shimoga.—The Committee resolved to hold the Cattle Show at Shimoga on the 25th March, 1920.

Cultivation of Pepper.—The names of five gentlemen who promised to undertake the cultivation of pepper if Government supplied cuttings free, were proposed to be intimated to the Agricultural Board.

INDUSTRIES AND COMMERCE.

Sandalwood Carving Industry.—Regarding the improvement of sandalwood carving industry at Sagar and Sorab, the Committee approved the following suggestions of the Sub-Committee and resolved to make the necessary recommendation in the matter.

- (i) That the Director of Industries and the Director of Archaeological Researches be requested to kindly supply the designs.
- (ii) That the Government be requested to buy a choice collection of sandalwood articles of the value of about Rs. 2,000, prepared by the Gudigars and to keep them as samples of their work in the Arts and Crafts Depot, Bangalore, in separate show cases. These may be shown to the visitors and orders booked for the supply of similar one.
- (iii) That arrangements be made at Sorab and Sagar to supply the indents of the officer in charge of the Arts and Crafts Depot for such articles through the local Gudigar Co-operative Societies.

QUERIES.

Hints to Correspondents.

Write on one side of the paper only. (2) Write each query on a separate sheet of paper. This will facilitate answering questions as in many cases they may have to be referred to experts. Put your name and address down on every such sheet. No attention will be paid to unsigned queries. (3) Drawings for illustrations should be on separate sheets of paper. They must be made in black ink only on white paper—not in pencil or colour—and twice the size they are intended to appear, especially reference letters and figures. (4) Put titles to queries, and, when answering queries, put the number as well as the titles of the queries to which the replies refer. (5) No charge is made for inserting letters, queries, or replies. (6) Letters or queries asking for addresses of manufacturers or correspondents, or where tools or other articles can be purchased, or replies giving such information, cannot be inserted except as advertisements. No question is answered through the post. (7) Letters sent by correspondents, under cover to the Editor, are not forwarded and the names of correspondents are not given to inquirers. (8) As the space devoted to queries and replies is limited, they should be drawn up as briefly as possible. (9) To facilitate reference, correspondents' when referring to any letters previously inserted, should mention the number of the letter, as well as the page on which it appears. (10) All communications should be addressed to the Editor *Mysore Economic Journal* "Ringwood," Bangalore.

Query 1.—Please let me know where I can find market for the undermentioned at America, England, and India:—

Balila (Hindustani)
 Chilliog (do)
 Seed of Cashew nut.
 Tamarind.
 Palghat tobacco
 Bidi tobacco.
 Nux Vomica.
 Soapnut.
 Bones and margosa seeds.

H. P. GHATTALAH.

BOOKS IN BRIEF.

Outlines of Social Philosophy.—By J. S. Mackenzie, Lit.D., LL.D., Emeritus Professor of Logic and Philosophy in University College, Cardiff. Published by George Allen and Unwin Ltd., London W. E.

We have great pleasure in introducing this book to our readers. Those who know Professor Mackenzie's writings know what to expect from his pen. One of the first to deal with Social Philosophy he has had a succession of admiring readers during the three decades and more since his *Introduction* to its study was published. Professor Mackenzie intends this volume to take the place of the old *Introduction*. And it is well that he has had an opportunity to write what really seems to us a fresh book on the subject. The present work is a systematic one and has grown out of a course of lectures delivered before the London School of Economics in the Session of 1916-17. "I have tried," he writes, "to expound the leading principles in a way that might be expected to be intelligible and interesting to beginners, and at the same time to supply some material that might be useful to more advanced students, and to indicate directions in which further light could be sought on the subjects that come up for discussion." This is what makes the book suitable both for students and general readers. It is stimulating and suggestive to a degree. Its views, being based on the writings of T. H. Green and Dr. Bosanquet, are perfectly sound. What is more, it is written in no partisan spirit and whether it is religion, science or philosophy he is discussing, he is anxious to be both impartial and judicious in his statement of the case. (See pages 223-225 for instance). For many years, the want of a book of this kind has stood—at least in India in the way of social philosophy being a subject of study much in the same way as politics has been. Now that ground for complaint will no more be available. We would commend the book to the kind attention of the History and Philosophy Boards of studies of the various Universities in India. If some of them made a beginning in the matter the others are likely to follow in due course.

Britain Victorious.—By M. P. Webb, C.I.E., C.B.E., Late Chairman, Karachi Chamber of Commerce. Published by Messrs. P. S. King and Son Ltd., 2 and 4, Great Smith Street, Westminster, London.

Mr. Webb appeals to the better instincts of man in this book. "Often we beg assistance" that is the tag that appears on its opening page. Those who differ

from him will, we have no doubt, do so without doubting his convictions in the matter. He agrees with Mr. Clynes in thinking that those who were working to give their lives for their country will not dishonor their class by withholding their wealth from it. He thinks that the key to the restoring of economic order in Britain is to be found in the willingness of the people to sacrifice more and more for the State. He is not for a capital levy; in fact he thinks the time is ripe for doing away with even the income-tax and substituting for it an Expenditure Tax, to prevent wasteful expenditure on luxuries. He thinks that the only way in which the large national debt created by the war is by what he calls "national monetary sacrifice." This idea is developed at length in this book. (See pp. 96, etc.) The only objection against this is that it will tax those who have already made sacrifices enough and leave those who have juggled to escape from all sacrifice. That seems putting a premium on the lack of public spirit and discounting altogether the very highest kind of patriotism. All the same, we do not see any objection to an appeal of the kind to the nation's patriotism proposed by Mr. Webb being made. Those who have the instinct unimpaired in them by the doings of the adventurers are likely to respect the appeal as readily as ever before. It is only when Mr. Webb talks of compulsion that we cannot see our way to agree with him. Voluntary payments are no doubt to be welcomed and even commended but compulsion is simply out of the question. We think it would be inexpedient, if not unjust to have recourse to it. The exact opposite is the case with the proposed levy of capital; it seeks, in its essence, to attack those who have grown rich by expropriating—to use Mr. Webb's phrase—"the nation's necessities during the terrible period of peril." Compulsion in their case would and could be justified. Subject to the remark we have made, there is in Mr. Webb's idea something to ponder by those who mean business in the region of post-war finance.

Human Industrial Efficiency.—By Henry Chellaw, M.A., Ph.D., D.Sc., Lecturer, London School of Economics. With a preface by the Rt. Hon. Lord Sydenham, F.R.S. Published by the University of London Press. Price 3sh. 6d. net.

Only recently we reviewed in these pages Mr. Tead's *Instincts in Industry*. Dr. Chellaw's book belongs in one sense to the same class. It is extremely suggestive and stimulating to a degree. His main object is "to indicate to the busy executive mind where the chief difficulties in industrial life exist and to offer various suggestions how they may be satisfactorily served to the benefit of the worker in the first place, and the peace of mind of both the business administrator and organiser." Dr. Chellaw brings to

bear on his work a broad outlook; his views are practical; and his style simple and direct. He insists on the importance of the human factor, which has been neglected for ages in economic computation. "Human efficiency" we frequently talk of but hardly do we know how to address it. Dr. Chellev analyses this phrase in the opening chapter of this book and we would refer those who have to deal with Labour generally to read it and inwardly digest it. Two chapters which we have read with unabated interest are those dealing with the selection of employees and scientific management. There are three brief appendices to the book and they are worth referring to. One is devoted to the subject of handling the human factor, being a review of the systems now in vogue with a supplementary note by the author. Another deals with the training of executives for efficiency, which draws pointed attention to the need there is for functional and staff training. It really shows the lines on which "leaders" can be produced for business purposes. The third outlines a scheme for establishing efficiency clubs in business offices. Dr. Chellev says that "it has been found in actual practice that a scheme such as is outlined is most effective, in the production of results and the development of the personal factor to the very highest degree of efficiency." The book is, as Lord Sydenham points out in his preface, suggestive of the cause of the present industrial unrest and ought to be welcome to all who care for the welfare of the workers in the industrial domain.

RELIGIOUS EDUCATION.

We have received a number of booklets and books from the C. L. S., Madras, dealing with Bible Studies, the *Life of Christ*, *English Reader* No. 3, (Direct Method Series), &c. Among these is Professor A. J. Saunders' *Problem of Religious Education in the Public School as seen in the Bell-Lancaster Controversy*. This booklet raises incidentally the important question of religious instruction in public schools. Professor Saunders' view, which we think in the main sound, is stated in the last pages of his booklet. Almost the last paragraph in it sums up his conclusion in these words: "May we have religious instruction in the public schools? Yes, it would be a very unwise thing for India to forbid all religious instruction in a system of national education. May the Bible be permitted in such schools as desire it in the new scheme of national education? Yes, it would be unfair to forbid it. And it can be so arranged that the conscience of Hindus and others need not be hurt by its use." In the penultimate paragraph he writes:—"Attendance of Hindu children at these Bible exercises may be

optional in a single school area, or they may choose to attend a school which does not offer Bible instruction in an area which has many schools." We do not think that educated Indians who have written or spoken on this subject—pace the Hon'ble Mr. Srinivasa Sastri's campaign for a "conscience clause" in Mission Schools—have asked for more. The merit of the booklet lies in our opinion in the manner in which it brings out the impetus that the Bell-Lancaster controversy gave to primary education in England. It has been the fashion in certain quarters—more especially in recent articles in educational magazines—to say that Bell's so-called "Madras System" was no system at all and that the worthy Doctor spent his time and energy in barren controversy. That this is not a correct picture of either Bell or his work is well illustrated in this booklet. We would ask every educationist to read it. We note that Professor Saunders refers to most of the literature in his Bibliography. We have read, as we have said, recent articles on Bell and his system in Educational Magazines. A good pen picture of Bell will also be found in the late Mr. Charles Lawson's well-known work *Memories of Old Madras*.

ACKNOWLEDGMENTS.

Report on the Progress of Agriculture in India for 1918-19.—Calcutta, Superintendent, Government Printing, India, 1920. Price Rs. 1-4-0 or 2s.

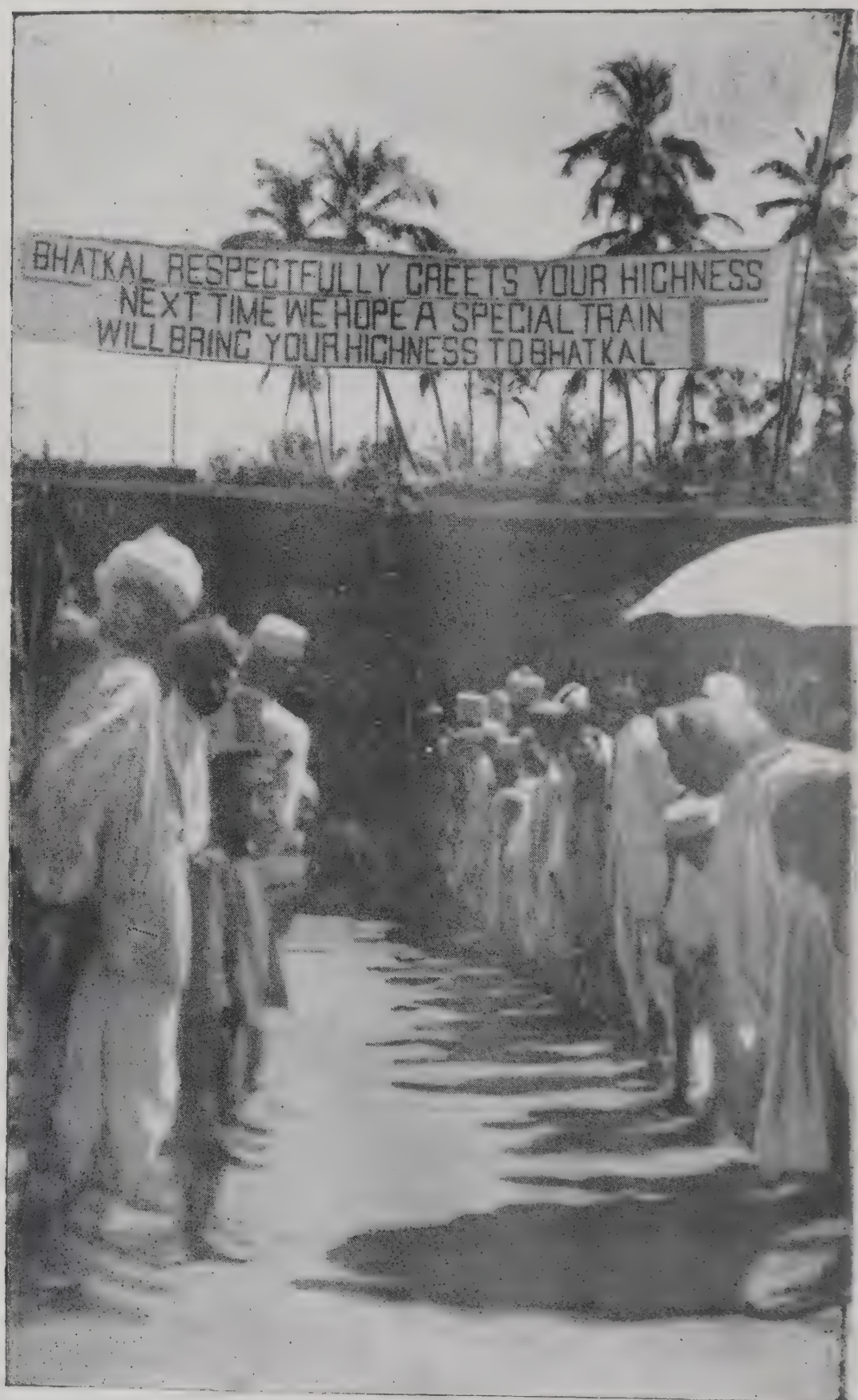
Proceedings of the Board of Agriculture in India.—Held at Pusa on the 1st December 1919 and following days, Calcutta, Superintendent, Government Printing, India, 1920. Price As. 12 or 1s. 3d.





HIS HIGHNESS THE MAHARAJA OF MYSORE AT BHATKAL.

I. VIEWING THE HARBOUR.



H. H. THE MAHARAJA OF MYSORE AT BHATKAL.
II. RECEPTION AT THE PENDAL.

The Mysore Economic Journal

A Monthly Periodical devoted to the Discussion
of all Economic Topics of Interest

PUBLISHED UNDER THE AUSPICES OF THE MYSORE ECONOMIC CONFERENCE

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No. 4

LEAVES FROM A DIARY.

Education in Japan—II.

By "M"

FOR carrying on a satisfactory system of national education, the first step was to provide good teachers, Government engaged American and English instructors at first and at the same time began training abroad their own men for the work. Picked men from its schools and colleges were sent to receive education in Europe and America. In 1873, there were 373 Japanese students in foreign countries, of whom 250 had been maintained at Government expense. This number was subsequently reduced. By the end of 1890, about 67 students had returned home many with diplomas and other honors, some these were appointed professors in the University and other institutions which others were taken into public service in the departments to which their special training had fitted them.

There were 59 students maintained on Government stipends at the time of my visit in 1898. The greater number 26 of these were in Germany where the Japanese believe the quality of education imparted is more perfect than in any other country. It is cheap also. The subjects they were sent to study were agriculture, metallurgy, commercial science, Political Economy, Civil Engineering, medicine, law, history and

philosophy. Two students were in England one studying naval architecture and the other a female student in the training school at Cambridge. One was in France studying fine arts, two in Austria studying medicine and one in America studying Chemistry. The remaining 27 students were deputed to visit more than one country studying in each all that could be learnt in his special subjects. They were to learn one or more of the following subjects. Iron manufacture, electric engineering, seismology, chemistry, fine arts, botany, commercial science, law, politics and the method of instructing the deaf and the blind. The stipends allowed were £150 yearly for Germany and £180 for other countries. Though America was nearest to Japan, the education imparted there was considered expensive and superficial, the German, bring thought both good and cheap.

PRACTICAL CHARACTER OF EDUCATION.

The object of the Japanese Government is to make the nation strong and prosperous. The goal kept in view by each class of education is clearly defined and the system of instruction necessary to attain that goal is worked out with a desirable thoroughness. To become strong and wealthy, they or their leaders are combined that nothing but European ways of their king and European methods of work will avail them. They recognise that to become a powerful and united nation, they must foster loyalty, patriotism, discipline and sense of duty. This is done

by military drill in the schools and by instruction given in morals and ethics in every elementary or high school. They aspire to become prosperous and rich and they have found out from the examples of England and Germany that industries and trade should be developed. English as the representative language of the highest civilisation and science is made a second language in the public schools and the University. Not only are a large number of commercial and technical schools scattered through out the country, but in elementary schools also, they have supplementary classes to teach the student the use of the eye and the hand. It will be seen further on even the highest scientific education is given at the Universities which are made not merely receptive but productive centres of education.

Discipline, industry, training for practical life, the highest training in the practical science and arts and political economy. These sum up the character of the present day education in Japan and all this has been developed with startling suddenness.

The result is there is perfect discipline in the workman who does the work entrusted to his whether the master's eye is on him or not and who will not be enjoled or bribed out of it. This excess of practical elementary education, not the sort of elementary education given in India, where a youth is taught just enough to discard the occupation of his fore fathers and not sufficient to turn his hand to any new occupation. General education is all very well when combined such combination, it may elevate the mind without bringing food to the stomach. The teaching of economics receives special attention in Japan. Political economy as it concerns individuals is taught in the elementary schools under the subject of morals. Political economy as regards the higher occupations, commerce and the State is taught in the special colleges and Universities. The absence of instruction in the science of economics is a serious defect in the Indian

system of education. The sense of proportion and the faculty of finding not for the present only but for the future is wanting in the ordinary public men and journalists in this country and is at the bottom of many errors into which they so frequently fall.

PROFESSORS.

I have already said that the work of the professors is largely a matter of self-sacrifice. In the Government publications giving a history of the University no Japanese names are mentioned among the promoters. In European countries, they would take a pride in perpetuating such names. In Japan, the workers efface themselves out of humility. They all sink themselves in their work.

THE JAPANESE STUDENT.

The Japanese student takes his studies very seriously. An eminent Scotch professor one of the oldest professor in the Tokio Imperial University spoke of his pupils in terms of affection. "The students" he said *note* upon speaking an untruth as base and are very good. The Japanese graduate is better educated than the English graduate. The Japanese is most serious. He is a beautiful super-minister. The English students are fond of *fun* and are less answerable to discipline. The Japanese graduates are at the top of their classes in Germany, England and America. But the Englishman develops as he grows but the Japanese does not improve in the same degree in after life.

If a Professor does not teach well he is turned out by the authorities. The students are usually the instrument. They are not mischievous but are very shrewd and wise. The authorities listen to the voice of the students (though not openly) and remove a Professor who does not give satisfaction. Students are in this respect a power in the University.

"As for the typical Japanese student," says, Professor Chamberlain, he belongs to that class of youths who are the schoolmaster's

delight-quiet, intelligent, deferential, studious almost to success. His only marked faith is a tendency common to all subordinates in Japan to steer the ship himself. 'Please sir, we don't want to read American history any more. We want to read how balloons are made.' Such is a specimen of the requests which every teacher in Japan must have had to listen to over and over again."

GENERAL SYSTEM.

The highest education is that which culminates in the University and a student aspiring for University honours has to pass through the following course of instruction.—

Lower and upper primary	6 years
Middle school	3 or 5 years
High School	3 years
University	3 or 4 years

Thus a boy who begins his education in his sixth year, completes his University course at the age of 23 or 24 if he prosecutes his studies without interruption. For those who have no desire or cannot afford to study for higher courses, supplementary instruction is provided to enable them to hurry over subjects which in the regular course as usually taught at a later stage.

The system of education was originally on the lines followed in America but at present it is largely on the German model. As already remarked, education is compulsory by law and it is binding on the parents to keep at school every boy or girl between 6 and 14 years of age until they have completed the ordinary elementary school course. The law is indulgently administered. Many exceptions are made for poverty and sickness as the country is not in a sufficiently prosperous condition to afford absolute compliance. At the age of 20, every able-bodied person is required to undergo military training for 3 years. In the case of students, this period is extended up to the 28th year so as not to interfere with their education. After the 28th year, no student could be at a college or a University. The period of military service is reduced to one year in the

case of those possess who are able to serve in the army at their own expense.

ELEMENTARY EDUCATION.

The elementary schools are intended according to Government reports for giving children the rudiments of moral education and of education specially adopted to make of them good members of the community together with such general knowledge and skill as are necessary for practical life, due attention being paid to them readily development. Knowledge and skill imparted to children should be sound and practical. Such topics, it is laid down, as refer to the necessities of daily life and conduct should be selected and taught so as to enable children intelligently and practically to apply what they have learnt.

When the parents are unable to pay tuition fees, provision is made with regard to the whole or partial remittance of those fees and the substitution of payment in kind or in personal labour in order to facilitate the attendance of children.

Handwriting used to be assiduously cultivated as an art hitherto but the number of schools which teach this is now discouraged and has been reduced; because as the official account says "the recent progress in arts and science as also the daily occupation of the people has made the latter feel the necessity of studying more useful subjects and not continuing themselves with a mere knowledge of writing."

The elementary schools are of two classes *viz.* the ordinary and the higher. Both however may be combined into one institution in any locality. The subjects of study in the ordinary elementary schools are, morals, reading, composition, writing, arithmetic and gymnastics. According to local circumstances, gymnastics may be omitted and one or more of such subjects as Japanese geography, Japanese history, drawing, singing and handiwork may be added. The subjects taught in the Higher elementary schools are :

Morals, reading, composition, writing, arithmetic, Japanese geography, Japanese history, foreign geography, science, drawing, singing and gymnastics. One are more special courses in agriculture, commerce or industry may be established according to local wants. There are also supplementary courses in which instruction is given in agriculture, industry, or commerce or such subjects of study as have immediate reference to the present or future occupations of the children.

All expenses for elementary schools are to be borne by the cities, towns or villages concerned. In exceptional cases aid is given from the local revenues. The education is entrusted to a school committee under the official head or superintendent of each city, town or village. The teachers in the schools should form not less than $\frac{1}{4}$ th of the whole number on the committee. Government insist that each city, town or village shall establish and maintain schools sufficient to accommodate children of school age resident therein. Government insist also on a certain general standard being maintained for the rest, great latitude is left to the local authorities as to managements and the special subjects to be taught according to the occupation and wants of the people in the locality.

In teaching *morals* in every school, the special object is it is laid down, the cultivation of the conscience of children, the fostering of their moral sensibilities and the enforcement of the practical performance of human duties. It is provided that the spirit of loyalty and patriotism shall be specially awakened. The young student is given advice regarding the social sanctions, sense of honour and his duties towards the state. Teachers are enjoined to take pains to secure firm and lasting results.

In teaching *geography*, it is provided that instruction shall commence with a description of the physical features of the district in which the children live. According to the length of the study, minute description shall be given in the more important subjects

relating to the life of the people with reference to political economy.

In giving instruction in natural science, the young student should be made to comprehend such topics as the relation of plants and animals among themselves and to man, the physical and chemical phenomena of common occurrence and the constitution and operation of such apparatus as come under daily observation, the elements of human physiology and hygiene being taught at the same time. Those topics which relate to agriculture and industry should as far as possible be given, besides such as are specially adopted to the requirements of daily life.

With regard to instruction in gymnastics, in higher elementary schools, boys are chiefly instructed in military gymnastics and girls in common gymnastics or *calisthenics*. Outdoor exercise and excursions in the country are encouraged. Instruction in swimming may be given in summer.

Where manual work is taught, the articles manufactured should be such as are useful for practical purposes, attention being always paid to the formation of economic habits. In cases where agriculture is taught, practical lessons are provided when possible to cultivate the taste for agriculture and to foster the habits of frugality, diligence and saving.

In cases where commerce is added to the courses of the higher elementary schools, the topics taken are those which have an important bearing upon such subjects as shops, companies, buying and selling, circulation of currency, transportation, insurance etc. and of those which can be easily comprehended shall be taught in accordance with the commercial usages and regulations. A simple system of commercial book-keeping is also taught.

Female children while young are taught in the same schools as boys. If the number of the former be larger, they are taught in separate classes where cutting and sewing is taught, specially to female children, the object it is stated is to make the children proficient in the *cutting and sewing of garments for ordinary wear*. Instruction is given in the management of the needle, the sewing and

mending of common garments, the preservation and washing of dresses, attention being always paid to the desirability of frugality.

Of the elementary schools I visited, I have very pleasant reminiscences of my visit to the primary school attached to the higher normal school at Tokio. A Professor of the higher commercial school, a gentleman of a most sweet and obliging disposition, accompanied us. In one of the classes we noticed the students marching in martial order into the school room singing some national songs. We next visited a class where mental arithmetic was being taught. Each boy was provided with a separate stool and desk. The teacher put a question and several boys raised their hands to show that they knew the answer. The teacher chose one of these to give the answer and he did so. When the answer was incorrect or absurd, there was general laughter. All the boys were in the school uniform which has a military style. Their overcoats, caps, umbrellas, and other belongings were left in the verandah all arranged according to some order without the possibility of a mistake, which was a model of neatness. We were next taken to a class where singing was being taught to the accompaniment of a musical instrument. They sang to us the national anthem of the country. Then we went to a class of children of about 6 years of age, all dressed similarly, a most pleasing sight. In every class we visited, we noticed nothing but cheerful faces.

There were 485 children in all in the school. The school fees ranged between 12 annas and Rs. 2-4-0 reckoned in Indian money.

The Japanese children spend much of their time at school. Our friend the Professor informed me that in his school days, they went very unwillingly to school. There is no competition in the classes for daily rank.

There are music classes and military drill for amusement and exercise and to relieve the monotony of writing and arithmetic. The teachers do not frown and children are willing to go to school. The Professor told us that corporal punishment in the school room was unknown in recent years in Japan. For this, however, I cannot vouch, as a University student to whom I mentioned the Professor's remarks put on a long face and replied, "All I can say is the Professor has forgotten his school days but my own experience is of recent date."

INDUSTRIAL DEVELOPMENT OF SOUTH INDIA.—III *

General and Educational.

BY GILBERT SLATER, M.A., D. SC.,
Professor of Indian Economics, University of Madras.

SINCE I began this short course of lectures, I have received communications from various gentlemen calling my attention to specific problems. On some of these I propose to touch this evening, using them as illustrations of general principles.

I. I have received a circular which proposes at once the establishment of Vernacular Schools of Navigation, and the launching of a 'Madras Ship-building Company, Limited', the greater part of the capital of which is to be devoted to the building of a steamship. Now industrial development must include development in the three fields of agriculture, manufacture and transport. Land transport is in India peculiarly a matter for Government, which in one form or other is almost entirely responsible for both roads and railways. But the sea lies open to private enterprise. I am therefore not surprised that Indian industrial ambitions are continually pointing towards the creation of a great Indian ship-building industry and the establishment of Indian steamship lines. But, on the whole, I fear I must warn you against hastily putting money into companies for this purpose at present. Established lines have an awkward habit of resenting the coming of a new competitor, and, if that new-comer is not very strong, of endeavouring to crush it out of existence. The general idea I would like to suggest to you here is the desirability of building on an exis-

*A Lecture delivered in Madras. The first and second lectures of this series were published in the January and February issues of this *Journal* [Ed. M.E.J.]

ting foundation. The building of sailing-ships is an industry which has never ceased in India, and such ships make reasonably profitable trips from one Indian port to another, and even go further afield. Would not the next step in development be the building of somewhat bigger ships, equipped with auxiliary motors, either petrol or Diesel oil engines, which could make way against a calm or moderate head wind, while still exploiting the advantages which the comparative reliability of Indian winds afford to sailing-ships pure and simple? Such a development would not excite the jealousy of the British India Steam Navigation Company and if it were sufficiently successful might serve for a fresh starting point later on.

II. Since last week another new enterprise was brought to my notice. Mr. S. Ramachandra Aiyar called upon me, and arranged for me to see the 'Ramachandra water-lift' in operation. You doubt, less or familiar with the ordinary bullock water lift of the Madras Presidency, said to have been invented many centuries ago by a famous Indian mathematician called Kabala, and hence termed the Kabalai. The Ramachandra water-lift is a simple and ingenious modification of the same idea. One ox takes the place of the pair. The slope away from the well is made slightly steeper and iron rails are laid down on it. On these a low platform slides, supported on four cast-iron wheels. The ox faces the well instead of having his tail turned towards it. He stands with the driver on the platform, which then rolls gently down the inclined plane, drawing up the bucket full of water. At the end of the run the bucket automatically empties itself the ox and the driver step off the platform, and the weight of the bucket descending to the water draws the light platform up the slope. The ox and the driver walk after it and the whole process is repeated. I must say that I was greatly impressed by what I saw. The ox does the work by walking in a perfectly natural manner up a slope, and therefore uses his strength

in the most effective and least tiring manner. I have great hopes that tests under expert supervision will justify Mr. Ramachandra's confidence in his invention. But the general principle I desire here to emphasize is that great gain will result when the ablest intellects in India are in some measure diverted from abstract and legal and political studies, and directed towards the solution of the ordinary problems of life.

III. A good many people have complained to me that in my two previous lectures I said nothing about the tariff question, and that they consider, is the very root of the matter of Indian industrial development. Now rather more than three years ago, when I had newly arrived in Madras, I spoke upon this subject. I then expressed the opinion that as Indians appeared to be so unanimous in desiring a protective duty on cotton goods, this ought to be conceded, both because the refusal makes it appear as though Lancashire interests weighed more with the Secretary of State than Indian wishes, and also because as long as Indians believed that the tariff was the one thing necessary they were not likely to face the real problem until they were allowed to try their remedy. Since then the Government of India has moved, in my opinion quite rightly, in that direction, and we have now had, for some time, a protective import-tax of $7\frac{1}{2}$ per cent ad valorem on all imported cotton goods. The real effect of this will be seen later. Hitherto a $7\frac{1}{2}$ per cent tax has been a small matter compared with the difficulties of manufacture and transport created by the war, and still persisting since its close. I am bound however to confess that the response of the Indian manufacturer to the opportunities created for him by the difficulty of securing foreign goods, and to the need for increased production of Indian goods, has been somewhat disappointing.

Nevertheless a tax upon imported cotton cloth appears to me to have merits of another

character. Since the Indian handloom weaver and the Indian mills supply the cheapest and coarsest cloths used in India, a tax on imported cloth is a tax on those who are best able to pay. It is tolerably well graduated according to income; whereas an income-tax proper is very unsatisfactory in India in consequence of the extreme difficulty in ascertaining what people's incomes are. An increase in the revenue seems to me imperative. Prices have risen greatly and are not likely to fall for many years to anything like the pre-war level, therefore all the expenses of Government are greatly increased. They are not increased as yet nearly as much as they ought to be. All small salaries paid to Government servants have become, through the rise of prices, miserably inadequate, and ought to be greatly advanced; and there are also many directions in which a great increase of Governmental activity is required. People say the need should be met by eliminating waste. But there never was, and in our time there never will be, any Government that did not waste money. A certain percentage of waste is a constant feature of all Governmental machinery, just as a certain amount of friction characterises all mechanical machinery. Compared with other Governments, that of India appears remarkably good, and I, for one, do not expect to see the slightest improvement in this respect coming as the result of the adoption of the representative principle. Representative Government has its merits, but nobody can say that has ever been found economical.

The question will have to be determined whether the small beginnings of a protective tariff already established in India shall be further developed. The modest $7\frac{1}{2}$ per cent may be greatly increased. What will be the effect of that? In my opinion, simply that foreign capitalists will come into India and set up their factories here. The share of Indian firms in the industrial activities

carried on in India would, I think, be reduced instead of increased. How are you going to deal with that difficulty? Obviously it can only be met by developing the capacities of the Indian people themselves.

So, therefore, stating the matter as seen from the broadest point of view, the problem of Indian industrial development is two-fold; it is the problem of conserving and developing the natural resources of the country; and then of conserving and developing its human resources. Let us take the former first.

Are we conserving the natural resources of the country? Are we not rather allowing some of the most important of them to be destroyed rocklessly?

India was at one time, there can be little doubt, almost entirely covered by forest. By slow degrees, the greater part of the country has been cleared and brought under cultivation. That is good, up to a certain point. It is calculated that in a temperate climate like that of France or Germany three quarters of the area may properly be cleared, but one quarter should be kept forested. In a tropical country like India the need of forest is probably greater, especially on hill and mountain slopes where the soil is washed away by the heavy rains wherever unprotected by tree roots. But India, leaving out Burma, has only 12 per cent of its area under forest. Further, much that is called forest and which was forest once is now treeless waste, producing nothing but rocks, prickly-pear, euphorbia, land ruined and devastated beyond hope of recovery. In the neighbourhood of Salem, I have hunted for tree life over the unreserved forests. Here and there is a sacred grove still surviving under the protection of a deity. But for the rest I discovered one tree, growing in the cleft of a rock, in a position equally inaccessible to goats and human beings. Even the condition of the reserved forests in the neighbourhood is but little better.

I think that one of the most discouraging features of Indian life is the manner in which

this question is handled by the speakers and writers who have taken on themselves the responsibility of guiding and expressing Indian opinion. Never does one find a speech delivered in the Legislative Council, or an article in the Indian Press urging upon Government more effective conservation of the forests. It is the officials of the Forest Department alone who are struggling to conserve this most valuable heritage of the Indian people, and they have everyman's hand against them. The peasant of neighbouring villages claims a fancied right to pasture his cattle on forests which by right belong just as much to villages at a greater distance. Forest is land bearing a growing crop of trees, just as much entitled to, and just as much requiring protection, as a growing crop of rice, or wheat or cholam. For one village to turn cattle—and still worse goats—into a forest which ought to serve many villages as a source of timber and fuel, is like one ryot in a village turning cattle to graze over the growing corn crops of the whole village. For a very small immediate profit to a few people the permanent interests of a whole community are sacrificed.

India must learn to be less tender of individual interests, more resolved to vindicate the general rights of the community. Her economic salvation depends upon it.

Now let us consider the question of the conservation and development of the human resources of South India.

Here let me give you the fundamental proposition of Economic Science which you will not find clearly expressed in any economic-text book hitherto published. It corresponds to one of the fundamental laws of Physics. Newton's third law of motion, 'action and reaction are equal and opposite.' We cannot make so precise a statement in economics. The law must read 'action is always accompanied by reaction, and, taking the whole field of human activity, action and reaction are equally important'. In any particular case the action may be vastly

more important than the reaction, or the reaction than the action. If a blacksmith strikes the hot iron on his anvil, the action, what he does to the iron, is more important than the reaction of the blow on the mind and body of the smith. But if a University student strikes a tennis ball on the Court, it is the reaction that is more important. But both are present in both cases. If it is reaction which we have in view, the activity is of the nature either of education or recreation; if the action itself, the activity is industrial. But since the two are inevitably linked, it follows that every industrial activity has its educational reaction. When the department of Industries set up a pencil factory here in Madras it acquired two things; in the first place a certain quantity of pencils of various kinds and qualities, and in the second place the knowledge of the process of making pencils in Madras, and the power of doing so at a profit. And as this is capable of being used as a means of acquiring the power of making other things also efficiently and profitably, it is of infinitely greater importance than the pencils themselves. Similarly, if the well-to-do gentlemen of Madras were to successfully launch and carry on efficiently a Ship-building Company, Madras would acquire not ships only, but an increase of industrial capacity.

It is by effort and by action that humanity learns. I think we want to get that idea into the Indian educational system. Yesterday I happened to look into a book about my native country of Devonshire by the well-known novelist Mr. Baring Gould. He described how he went into a school nestling below the hills of Dartmoor with His Majesty's Inspector. First the Inspector asked the children questions. He asked them to name the rivers of Siberia, and they did. He asked them to name the highest mountains of Africa, and they did. He asked them to give the height of the highest mountain of Africa and they did. And the Inspector was pleased. Then Mr. Baring Gould asked

questions. He asked them to give the name of the river which flowed through their village, and they could not. He asked them to give the name of the hill that overhung the valley, and they could not. He asked them how high the hill was, and they did not know. He asked the name of a common wild flower he had picked in the lane, and no one knew it. 'This', he cried, 'is the rubbish which we inflict on the children and call education.' Is there nothing of that unreal, unimaginative bookish quality in Indian education?

I have seen complaints that where the village school just teaches reading and writing in the vernacular, the ryots are very indifferent as to whether the children attend or not. I think that is perfectly natural. The children probably learn a great deal more out of school helping their mothers when they are little, and their fathers when they are bigger, than they do in school. Boys and girls who learn to read English have access to all the science and most of the literature of the world opened to them. The boy or girl in a South Indian village who learns to read Tamil, what has it open to them? Judging by the books I have found accessible in villages scarcely anything of value. Even the ancient poetic and dramatic literature of the country itself, so far as I can ascertain, is made quite as familiar, by travelling reciters and dramatic performances, in the backward districts where few know how to read and write as in those better equipped with schools. In many a district of England the old songs, games, and dances which did so much to sweeten toil have vanished before the blighting contact of the public elementary school. I fear a similar phenomenon in India. The teacher who is of use is the man who has made and is making a success of his own education and his own life, the man who is efficient in other things than in the subjects he teaches in the school, the man who makes his power and influence felt by the adults in the village as well as by the children. Such a man can help children

to grow up into efficient men and women and good citizens. One or two school masters of that type are more good than hundreds who take to teaching and accept starvation pay for that exhausting work, because they are fit for nothing else.

For the details of educational reform, I have no time now. I must content myself with the remark that a much closer linking up of the school curriculum with the actual industrial life of the village or town in which the school is situated will be good both for education and for industry.

In conclusion, as I am now completing this my third lecture on 'Industrial development', let me remind you that industry exists for man, not man for industry. India might hum from end to end with the machinery of cotton mills and woollen mills and silk mills. Her stores of coal and iron might be exploited to the utmost, her ports might be crowded with ships of her own building, carrying her manufactures all over the world, and yet the average Indian might be no better and no happier than he is to-day. Industrial development gives economic power. Economic power is neither good nor evil in itself, all depends on the use which is made of it. The Western world has been too absorbed in its pursuit of industrial efficiency and material powers, too little careful about the application of such power to the best and highest uses, and it has received a terrible lesson. India needs to put more effort, more intelligence, and more conscientiousness into industry. But India must also realize the importance of securing the just distribution of the fruits of industry, and of wise use of economic power to promote health, happiness, intellectual culture and spiritual advance.

SUGAR-CANE CULTIVATION IN MYSORE.

BY LESLIE C. COLEMAN, M.A., PH.D.

THE average area under sugar-cane in Mysore for the decennium 1908-09 to 1917-18 was 38,368 acres. The variation was from 32,287 acres in 1915-16 to 44,404 acres in 1911-12 (See Table I). The average area under irrigated crops during the

same period was 960,956 acres so that sugar-cane occupied 4 per cent of the area irrigated. An examination of figures for the previous decennium shows that there has been no appreciable change in the area under sugar-cane for the past twenty years. Annual fluctuations in the area may be quite large but the average over a series of ten years remains about the same.

The great bulk of sugar-cane in the State is raised under tanks, channels from rivers supplying only an insignificant part of the

TABLE I.

Area in acres under Sugar-cane according to Districts.

Year	Bangalore	Kolar	Tumkur	Mysore	Hassan	Shimoga	Kadur	Chitaldrug	Total for State	Total Irrigated area
1908-09 ...	3,897	7,879	1,830	4,027	5,717	7,850	1,878	878	33,256	8,88,862
1909-10 ...	3,157	6,377	1,576	7,007	9,923	5,052	1,017	863	34,972	9,39,250
1910-11 ...	4,433	8,349	2,120	4,975	10,728	6,388	1,189	2,328	40,510	9,74,694
1911-12 ...	5,558	9,874	3,226	6,010	6,471	8,128	1,403	3,734	44,404	9,48,463
1912-13 ...	5,519	8,962	3,976	6,767	6,632	6,679	1,662	1,358	41,555	9,71,343
1913-14 ...	5,423	9,078	2,769	6,128	7,275	6,553	1,669	2,123	41,018	9,74,170
1914-15 ...	4,384	7,605	1,740	4,621	6,101	7,484	1,778	504	34,217	9,38,074
1915-16 ...	4,014	7,320	1,964	4,414	3,879	7,842	1,830	1,024	32,287	9,50,748
1916-17 ...	5,124	8,977	1,923	4,915	4,087	8,231	1,738	1,111	36,141	10,14,867
1917-18 ...	6,206	9,818	2,447	6,191	6,023	9,061	2,000	2,582	44,328	10,09,089
Average ...	4,751.4	8,423.9	2,357.1	5,509.0	5,783.6	7,326.8	1,616.4	1,650.5	38,268.8	9,60,956.0

whole and wells supplying a still smaller area. It is, I think, safe to say that not more than 70 per cent of the sugar-cane grown in the State is supplied from river channels. The reason for this lies chiefly in the fact that channel supplies are almost invariably cut off in the hot weather so that if the lands are not commanded by subsidiary tanks which may, in some cases, be filled

from the channels during the monsoon season it is impossible to grow cane. The restriction of the growth of cane to areas under tanks helps to explain why our area is not increasing. Of the 20,000 odd tanks in the State, only a comparatively small number have an assured perennial supply.

The fluctuations in area noted are due to a combination of causes. Undoubtedly the



FIG. 1.—INDIAN SUGAR COMMITTEE INSPECTING JAGGORY BOILING ON THE
BABBOOR FARM.

price of jaggery in any one year has a very important influence on the area planted in the following year but the supply of water in the tanks which is determined by the north-east monsoon has also an effect. Unless that supply promises to be sufficient to carry the crop for a whole year, cane will not be planted. Competition of food crops and insufficient labour supply are other important factors restricting the area under cane.

The average size of holding in Mysore is approximately 7 acres. Consequently the area of sugar-cane cultivated by any one agriculturist is usually very small. Only a very small number of land holders grow a sufficiently large area to allow them to install with profit a power-driven sugar-cane crushing plant. On the other hand there are a fairly large number of villages in which the area under sugar-cane exceeds 50 acres, so that there is considerable scope for the introduction of small power plants worked by joint-stock companies or co-operative societies. Efforts in this direction in the past few years have, however, not met with much success.

SUGAR-CANE VARIETIES.

The chief varieties of cane grown in the State are the following:—

1. Pattapatti.—A striped variety supposed to have been introduced about 150 years ago from the Madras Presidency. From two-thirds to three-fourths of the cane area in the State is occupied by this variety. It is a rich cane averaging about 20 per cent total solids, 19 per cent sucrose and 0.5 per cent glucose. It normally matures in 12 months and keeps uniform in composition for about ten weeks after that. In the western part of the State it is grown as a fourteen to eighteen month crop. It tillers well, responds well to manure, and under

good cultivation and high manuring, yields from 350 to 400 maunds (28 lbs. equals 1 maund) of jaggery per acre. It does not arrow freely, is not attracted by smut but is readily attacked by borers, pigs and jackals. As it is a top heavy cane it tends to lodge.

2. Rastali.—A soft white cane maturing in about twelve months. It is not so free a tillerer or so high a yielder as pattapatti. Its juice is also not so rich or pure. It is extensively grown in the Chitaldrug District and to a lesser extent in Kolar. It is frequently found as a mixture along with "Pattapatti." It lodges and is attacked by borer, jackals and pigs. A thinner variety of much the same general character is known as "Chitta Rastali."

3. Cheni.—A hard thin white cane, drought resistant. It can be grown on alkaline soils. It tillers freely and is a high yielder under good cultivation. It is grown largely in areas with precarious water-supply, where it is poorly cultivated and receives very little manure. Under these conditions where it is grown as an 18 months' crop, 80 maunds of jaggery per acre would be considered as a fair crop. It is attacked by leaf fungi and smut, but is resistant to jackal and pig attacks.

In addition to these three main varieties, there are a number of others which are not sufficiently important to warrant discussion.

The Agricultural Department has been engaged during the past 15 years in importing and testing canes from outside the State. Most of these have been obtained through the Madras Department. Of these, two

have actually found their way into cultivation and are likely to spread very rapidly. These are the following :—

1. Mysore Java:—This cane was apparently originally obtained from the Samalkota Farm as an importation from Java. As far as we are aware it is not now being grown in Madras Presidency. It is a light coloured cane with a rich juice and produces a fine light colored jaggery. It is not a free tiller or a very heavy yielder but is becoming popular in the semi-malnad areas where it is replacing the local pattapatti. The Java cane matures in 12 months. It flowers and lodges rather freely. The rind is hard, so it is resistant to jackal and pig. It is fairly drought resistant.
2. Red Mauritius.—This cane introduced from the Samalkota Farm in 1906 is the most vigorous and the highest yielding cane we have yet found. It has done well almost all over the State. In addition to its high yielding qualities, it does not lodge and

its hard rind protects it from wild animals. It is harder to mill than the local soft canes and does not produce as good a quality of jaggery; moreover, it is susceptible to borer attacks. These qualities make it unpopular in certain areas but its cultivation is spreading as the increased yield more than compensates for the extra labour in milling and the poor quality of jaggery.

Of the other exotic varieties tested here, Java 33 A. seems to be the only one which, up to the present, is promising. In addition to these we have a number of seedling canes many of which are the progeny of the vigorous Red Mauritius variety. None of these has yet been grown on a field scale but some of them have given very promising results on small plots. A number of the more promising seedlings are being tested this year in various different sugar-cane areas to ascertain their growth under different conditions of soil and climate.

The accompanying Table II gives the comparative yields of the indigenous varieties and the chief exotic varieties.

TABLE II.

Sugar-cane variety tests (Hebbal Farm)—Cane in tons and Jaggery in maunds (28 lbs. each) per acre.

Year	Red Mauritius		Java (Mysore)		Cheni		Rastali		Pattapatti	
	Cane	Jaggory	Cane	Jaggory	Cane	Jaggory	Cane	Jaggory	Cane	Jaggory
1913—14	34.5	271	22.9	166	30.8	220	21.8	187	27.9	280
1914—15	49.7	391	32.9	239	44.4	318	31.3	269	40.1	402
1915—16	37.2	314	24.9	210	27.5	198	27.4	257	...	...
1916—17	23.7	209	16.6	140	23.2	190	15.1	147	17.4	190
1917—18	39.33	331	29.89	240	43.18	288	24.1	187	30.53	247
1918—19	44.46	392	27.30	214	43.85	322	...	...	27.01	240
Average 1913 to 1919.	38.0	318	25.78	201	35.5	256	23.94	209	28.6	272
Maunds of Jaggory for 1 ton of cane...	...	8.3	...	7.8	...	7.2	...	8.7	...	9.5



FIG. 2.—VARIETIES OF CANE BEING TESTED ON THE HEBBAL FARM. 1. CHENI
2. LOCAL STRIPED. 3. RASTALI + J. 33 A. 5. JAVA MYSORE. 6. RED MAURITIUS.

CULTIVATION.

The most usual planting season in Mysore is the period extending from January to March, the month of February being the favourite planting month. Another fairly common planting season is September and October. Canes planted in this season are commonly allowed to stay on the ground from 14 to 18 months whereas the cane planted in January—March is commonly harvested at the end of 12 months. Although these are the two main planting seasons, there are areas where both planting and harvesting take place in practically every month in the year.

As indicated, the length of growth of the cane has considerable influence on the planting season. Thus in the malnad and semi-malnad areas where it is the common practice to allow the cane to grow 18 months, the cane is frequently planted just before the south-west monsoon so as to allow for milling in the dry season of the year. In other areas again, 18 month cane is planted in June and July.

TYPES OF SOIL, CULTIVATION AND PLANTING METHODS.

While sugar-cane can be and is grown upon almost any type of soil which has an adequate water-supply, still it is customary to use the best soil available. It is in the great majority of cases land upon which paddy is also grown and is therefore a dark clayey or silty loam.

The preliminary cultivation consists in either ploughing or digging the land. Digging is, however, less and less resorted to owing to the scarcity of labour. The wooden plough is still the common ploughing implement but people are more and more realising the advantages of the iron plough for sugar-cane cultivation. With the wooden plough from six to ten ploughings are commonly given. The other main preliminary cultivation is clod-crushing which is still done by hand with mallets. Levelling is commonly

done by the log harrow or large bullock hoe

The cane is planted either in pits or in furrows. In the more important sugar-cane areas in the eastern part of the State the furrow system is usually practised, the furrows being commonly not more than one and a half feet apart and the sets being laid end to end in the furrows. In the western part of the State and, in fact, wherever the supply of water is scanty during the early period of growth, the pit system is followed. The pits are commonly arranged in squares three feet apart each way and two sets to the pit. In the case of the furrow system, furrow irrigation takes place from the first; in the case of the pit system, early waterings are done by hand.

For planting, tops are used wherever possible as it is practically the universal opinion that these give more uniform and rapid germination. Whole canes have, however, frequently to be used and in our experience give quite satisfactory results.

After-cultivation consists in weeding, digging, earthing up and wrapping. Wrapping is practised only on thick canes and even with them chiefly in the areas of more intensive cultivation in the Eastern part of the State. Here it forms an important and fairly expensive operation. Ridging and earthing up are common only in the western part of the State where the heavy rains of the monsoon necessitate efficient drainage facilities.

Ratooning is a general practice only in the Western malnad part of the State, *i.e.*, the region of heavy rainfall. In other parts, the general experience is that ratooning does not pay and it is in fact rarely practised. The area of cane on which ratooning is practised is insignificant.

ROTATIONS.

The main rotation is a sugar-cane paddy one. Sugar-cane is usually grown in comparatively small patches surrounded by extensive paddy fields. The result is that drainage is commonly very defective. The

sugar-cane paddy rotation is undoubtedly a poor one from the stand-point of sugar-cane cultivation but paddy is such an important food crop that there is no likelihood of there being any marked change in this regard. Minor rotations which are to be found here and there need not be mentioned.

MANURING.

On approximately three-fourths of the sugar-cane area in Mysore no commercial manure is used. Cattle-manure, sheep-manure (by folding, tank silt, night-soil and to a very small extent green leaf brought in, form the sources of manure supply. Green-manures are practically never used for sugar-cane. On the remaining fourth, oil-cakes are used to a greater or less extent, the chief oil-cakes used at present being honge (3·5—4 per cent N.), castor (4—6 per cent N.), and groundnut (6—8 per cent N.) The use of cakes as a manure for sugar-cane is undoubtedly profitable where there are no other serious limiting factors. During the years of the War the Agricultural Department

made a strenuous effort to popularise the use of oil-cakes in areas where its use was unknown and a total of 1,438 tons was distributed in four years. The very rapid rise in price of these manures owing to the extremely large demand for both oil-seeds and cakes outside of India has seriously checked this work. However, even under the present high price of oil cakes these can still be very profitably used as manures for sugar-cane.

As will be seen the use of commercial fertilisers for sugar-cane is restricted to nitrogenous fertilisers produced in the country. Artificial fertilisers are practically unknown although the Department has given out small quantities of ammonium sulphate for trial. Experiments have just been commenced on one of the Experimental Farms with artificial fertilisers. There is no doubt that with an adequate supply of nitrogenous manures the outturn could be easily doubled. The results of manurial experiments already carried out and given in Table III show this quite clearly. The

TABLE III.

Sugar-cane Manurial Experiments.

Cane crop in tons and Jaggery in maunds per acre. One Maund = 28 lbs.

No.	Experiment	1916—17		1917—18		1918—19		1919—20	
		Cane	Jaggory	Cane	Jaggory	Cane	Jaggory	Cane	Jaggory
1	No Cake manure ...	10·7	107	15·52	170	22·25	208	23	239
2	One ton Honge cake ...	19·2	192	20·78	244	Discontinued.			
3	One ton castor ...	20·3	201	24·26	276				
4	Two tons Honge cake ...	21·6	231	25·70	279	34·47	329	34·6	317
5	Two tons castor ...	24·9	271	28·33	328	34·93	326	35·2	311
6	Three tons Honge ...	...	...	...	...	47·46	455	36·5	339
7	Three tons castor ...	...	...	...	...	48·55	468	37·3	341

N. B.—1916-18 Pattapatti. 1918-20 Red Mauritius. All plots were manured with cattle manure at the rate of 30 cartloads per acre.

possibility of making atmospheric nitrogen available to the growers of sugar-cane and other commercial crops is a question which I believe demands study in Mysore where electric power could easily be made available.

PESTS AND DISEASES.

The most serious insect pests of sugar-cane in Mysore are to the various moth borers of which *Diatraea* sp. seems to be the most important. As already noted, probably the greatest objection to Red Mauritius cane is its greater susceptibility to borer attacks as compared with local varieties. The Entomological Section has had these insects under study for some time. Measures calculated to reduce injury from borers already at least partially worked out are (a) early planting, if possible in January, (b) using heaps of trash in the fields as traps for the moth, and (c) removal of alternate host plants in the wild grasses and sedges which serve as centres of infection. The most important measure is undoubtedly early planting. On the Babboor Farm we are growing practically exclusively Red Mauritius cane on an area of 40 acres. If cane is planted in December and January we find the damage is negligible. If planting is delayed to March or April there is danger of the borers producing a large number of vacancies.

White ants are a serious pest on sugar-cane fields where the water-supply is insufficient or the soil is particularly non-retentive of moisture. The only other pest which has ever been at all worthy of note on sugar-cane is the rice grass-hopper. This has not appeared as a pest during the past seven or eight years. It can be fairly effectively controlled by early sweeping operations on grass bunds and lands in which the eggs are laid.

With regard to fungous diseases, smut (*Ustilago sacchari*) may do considerable damage to Cheni cane and also attacks J. 33A. to a lesser extent but the thicker canes are practically free. Red rot (*Colletotri-*

chum falcatum) which in some other parts of India is looked upon as a serious disease, here makes itself appreciably felt only under unfavourable conditions either of excessive moisture and faulty drainage or on the other hand of insufficient water-supply. We do not consider it a serious disease. Rusts and Leaf-spot diseases are almost entirely confined to Cheni cane where undoubtedly they do some damage. The fungus *Hendersonina sacchari* has been found on the Hebbal Farm producing the stunted growth described by Butler, but it has not yet been reported from the State in general.

Probably more serious than the damage done by any of the above diseases and pests except borer is that done by pig and jackal. Red Mauritius cane has shown itself much more resistant to attack than the local thick canes and its growth is spreading in many areas where jackal and pig attack is severe.

IRRIGATION.

As already stated, sugar-cane is chiefly irrigated from tanks. Canal and well irrigation are of minor importance in this State. The only immediate possibilities of large increases of areas for sugar-cane lie in the development of one or two sparsely settled irrigated tracts such as the Mari-kanave area in Hiriya Taluk, Chitaldrug District, and the area under the Sulekere Tank in Shimoga District. The former commands some twenty four thousand acres but the area which can actually be irrigated has been estimated at about fifteen thousand acres. The latter commands about 4,000 acres. The cultivation of sugar-cane in these two areas is at present very small, largely because of the very sparse population. If the second stage of the Krishnaraja Sagara dam is constructed 120,000 acres will come under irrigation. This would allow for a sugar-cane area of about 40,000 acres. Pump irrigation from our rivers notably in the Western part of the State could lead to a very great increase of sugar-cane cultivation. In addition there is the possibility of

installing electrically driven pumps in suitable areas along the various electric power lines. Demonstrations are at the present moment being carried out by the Electrical Department at Kankanhalli in this connection.

In most parts of the State irrigation water is required throughout the year. In the Malnad, however, this is not the case, the almost continuous rains of June, July and August requiring especially efficient drainage facilities, if the cane crop is to be kept from water-logging. In these areas the cane is little more than a rain-fed crop. The chief hindrance to the spread of sugar-cane cultivation under channels is the intermittent supply of water and even under tanks there would undoubtedly be a very much greater area were the water-supply assured. The construction of subsidiary wells in such cases is a subject which deserves attention.

The number of irrigations and the volume of water given varies very greatly. As already stated, in the malnad the crop is mainly rain-fed. In general, waterings are given every five to seven days during the first three or four months and every ten to fourteen days thereafter. The total supply of water on a well irrigated crop may be taken as 108 to 120 acre inches per annum.

As already pointed out in another connection the supply of water is not the only factor governing the planting of sugar-cane. Another equally important factor is the price of jaggery and a third, which in many parts of the State seems to be the all important factor, is labour supply. Thus under the Marikanave Reservoir, under the Sulekere Tank and generally throughout the Malnad where the population is sparse, cultivators restrict their wet cultivation very largely to paddy, a crop requiring much less trouble and labour.

MANUFACTURE.

The type of mill that is generally used is an iron three-roller mill made in Bangalore

or Madras. The old wooden mills have long since been superseded by these. These mills are not generally owned by the cane-growers themselves. Mills and pans are usually hired out by those who keep them for the purpose. In some parts of the State, people with mills and pans and the necessary cattle go round and take on contract the milling of the cane crop or actually purchase the standing crop. The efficiency of these mills leaves much to be desired. According to the tests made by the Department and published in the annual reports as much as 20 to 38 per cent of the juice contained in the cane is left in the bagasse. In recent experiments conducted, the extraction from these mills varied from 58 to 67 per cent on the weight of the cane; taking 10 per cent fibre in the variety of cane used for these tests, from 25 to 35 per cent of the juice contained in the cane is still left in the bagasse. A new type of mill introduced, the "Nahan" mill made in the Punjab, is more efficient the average extraction being 68 to 69 per cent on the weight of the cane; of course, all the above figures are true only for the variety of cane (pattapatti) used. The capacity of the Nahan is also slightly greater than the mills usually in use in the country and it is much more fool proof.

The kind of pan generally used for boiling the juice is a round one with flaring sides, the smallest pans being capable of boiling about 300 lbs. of juice. In an average size of pan about 600 lbs. of juice are boiled. The methods of liming vary to a great extent. In the Malnad, where mostly semi-solid jaggery is manufactured, the juice is not limed at all. In the districts of Bangalore and Kolar, very great care is taken about liming, and the jaggery produced is generally of a light colour with good keeping qualities. Lime is used as a fairly thick cream. In some parts of the Mysore District, very thin lime cream is used. Powdered lime is also used in some parts of the State.

Skimming is resorted to mostly where jaggery of good light color is produced, that is, in the Districts of Bangalore and Kolar. In the Mysore District which produces mainly dark jaggery skimming is done only when jaggery is made specially for domestic consumption.

In making jaggery the single furnace system is usually adopted. Begasse and trash are used as fuel for evaporating the juice. The available quantity of these two not being sufficient for the purpose, firewood is also used in small quantities to supplement them. Experiments conducted to find out the quantity of fuel needed have shown that one ton of good dry fuel (fire wood) is needed to boil down 6,000 lbs. of juice containing 20 per cent solids in solution. Attempts have been made to construct a simple form of multiple furnace with a view to utilize the heat of the waste gases and some fuel. So far as the present results go, the new system of multiple furnace has not shown any reduction in the fuel used, though there are other advantages in its favour. The multiple furnace system makes skimming easier and renders it possible to filter the syrup without much difficulty, thereby improving the colour of the jaggery produced.

The introduction of power mills for crushing sugar-cane has not met with any conspicuous success in Mysore. Various reasons have been assigned for this but one of the chief is undoubtedly the difficulty experienced in handling the large amount of juice turned out by a 12" x 18" three-roller mill. Such a mill does about ten times as much work as the ordinary bullock mill. The open pan system—no matter what kind of furnace is used—does not appear to be suited for working up this large quantity of juice into good jaggery and it is, to say the least, difficult to maintain good colour and quality in the jaggery when dealing with such large quantities of juice. Boiling by means of steam would undoubtedly greatly lessen the

difficulties but a suitable steam plant has yet to be introduced.

CENTRAL FACTORIES.

The question of Central Factories in Mysore is one that could be taken up on only one or two isolated areas. If the second stage of the Krishnaraj Sagara dam is completed there may be a chance for a sugar-cane factory in some place in the tract which will come under irrigation. There are, as far as I am aware, only two irrigated tracts at present existing where there is any chance for a sugar factory. These are the Marikanave tract and the Sulekere tract. In both of these, sugar-cane is at present an insignificant crop so that should a sugar factory be established in either of these places it would not have to compete with jaggery. The only place at present existing where a central factory crushing 500 tons a day could be established is the Marikanave area. The Department has been growing cane in this tract for the past three years and the results obtained indicate with proper cultivation and manuring yields of 30 tons per acre of Red Mauritius cane can be obtained after the land has been brought into fairly good condition.

I have given a general account of the present position of sugar-cane cultivation in the State and certain recommendation with regard to its improvement and extension. I now propose to discuss more definitely measures calculated to increase our outturn. As already pointed out the extent of our sugar-cane area and the outturn therefrom are largely controlled by three factors, namely irrigation, capital and labour supply. With regard to irrigation little need be said more than again to point out that if the schemes at present on hand are carried through we should be able to double our area under sugar-cane without any trouble. Even with our present irrigation facilities I believe that a large increase in area is possible if only the other conditions are met.

The lack of capital is undoubtedly a very important factor controlling not only area but outturn. Many agriculturists are deterred from planting sugar-cane because they have not the capital to spend on manure without the application of which sugar-cane ceases to be a particularly profitable crop. Even those who do apply oil-cakes to sugar-cane rarely put on anything like the most profitable amount. When we recall that on approximately three-fourths of our sugar-cane area no manure other than the local supplies of cattle manure, tank silt, etc., are applied and that the application of oil-cake will give a return of 100 per cent on the money invested we can see what immense scope there is for work in this direction.

Three ways lie open for the financing of manure supply in the State:—firstly, through the takkavi loan system, secondly, through co-operative credit and thirdly, through the Agricultural Department. Of these only the last has been utilized to any extent in the past. The work of the Agricultural Department has, however, had for its object, not the supply of manure on a large scale to sugar-cane growers, but rather the teaching of sugar-cane growers in as many areas as possible by practical demonstration the value of oil-cakes for sugar-cane. Its work has, therefore, been extensive not intensive. Nor do I think that the Agricultural Department should do more than this. If oil-cake supply is to be organized on a large scale, as I think it should be, some other agency will have to be found. The natural agency is, I believe, the co-operative organization but it will, in my opinion, be some considerable time before co-operation will be sufficiently advanced in this State to be able to take up this work in an efficient manner. The takkavi system appears to me the best calculated to give immediate results if some means can be devised to speed up operations. The chief obstacles in the way of utilizing takkavi loans for such purpose are (a) the long time which usually elapses between the application for

a loan and the granting of the loan, and (b) the tendency for a portion of the loan to evaporate before it actually reaches the hands of the man to whom it has been granted. I believe that both of these obstacles could be removed. To remove the first obstacle I would suggest, as an experiment at least, that an officer should be placed on special duty in an important sugar-cane growing District for say six months (*i.e.* from November to April) to investigate loan applications and make definite recommendations with regard to them. A District Economic Superintendent should, with the experience he has gained, be a very suitable man for such work and I can conceive of few lines of activity in which he could obtain more practical results. With regard to the second obstacle I believe it could be entirely removed if instead of the loan being given in cash it should be given in the form of manure supplied through the agency of the Agricultural Department on an order from the Revenue authorities.

That energetic steps should be taken to utilize to the full our supplies of oil-cake is only too evident. During the past six months large quantities of oil seeds have been crushed in the State the cake from which has gone to Ceylon and Java. If the planters of Ceylon and Java can use this cake profitably after paying transportation charges in addition to a high initial price surely with the high prices for jaggery which at present rule and which are likely to rule for some time to come our sugar-cane growers should be able to utilize it profitably. There are, in my opinion, few questions of more pressing agricultural importance than the question of the local utilization of our oil-cakes, the export of which forms at present probably the most serious drain on our agricultural resources.

I do not wish these suggestions to be looked upon as an attempt at a final solution of the problem. That final solution must

obviously rest with the development of co-operative activity but surely it would be a short sighted policy for us to sit with folded hands until such time as the co-operative movement is ready to take up this work. What we have to do is so to develop a demand for these manures as to make the formation of special societies for their purchase and distribution a possibility.

While the most striking increase in output of sugar-cane can undoubtedly be produced through the application of nitrogenous manures that is by no means the only way in which yields can be increased. The selection of varieties, and the improvement of methods of cultivation are also important.

As already pointed out the Agricultural Department has for some years been organizing the introduction of Red Mauritius cane into practically all parts of the State. The most marked success has been achieved in the Western part of the State where the variety usually grown is a comparatively poor yielder and where damage from pig and jackal is likely to be severe. In this part of the State there are now about 1,000 acres under Red Mauritius cane as a result of the Agricultural Department's activities. In the Eastern part of the State, Red Mauritius is not yet and is not likely to become so popular. In Bangalore and Kolar Districts where the cultivation of sugar-cane is on a higher level than in any other part of the State the local Pattapatti does very well. It is a cane which requires good cultivation and heavy manuring to give good results. Even under these favourable conditions it is not so heavy a yielder as Red Mauritius but it has two good points which the latter does not possess. In the first place it is a soft cane and is therefore more easily milled while it can be sold as a chewing cane, the most profitable method of disposing of cane near large centres. In the second place it produces a lighter coloured jaggery a feature which is considered of particular importance in these districts.

We see then that while Red Mauritius is at least for large areas of the State a very distinct improvement on the indigenous varieties it is by no means the ideal cane for Mysore. Certain seedling canes which have been raised from it promise to approximate much more closely to the ideal than does Red Mauritius, and should their early promise be fulfilled on a field scale we shall soon have canes for general introduction which should meet the needs of the great majority of sugar-cane growers in the State. An increase in yields of 25 per cent through the introduction of improved varieties is I believe quite a modest estimate. In many parts of the State Red Mauritius is already giving increases much in excess of this.

The last obstacle to be discussed in the way of sugar-cane cultivation is the scarcity of labour. Sugar-cane is a crop requiring very much more labour than almost any other crop grown in the State. Even with the introduction of every possible labour-saving device it will remain so. Where therefore as under the Marikanave and Sulekere Reservoirs we have large stretches of land either uncultivated or very indifferently cultivated the only chance for the extension of sugar-cane cultivation in the near future seems to be through the establishment of large plantations which will be able to organize a labour supply from outside. In many areas, however, where the labour difficulty is not so acute much could be done to reduce the labour amount per acre and so extend the area of sugar-cane cultivated. Bullock power is not used in sugar-cane cultivation to nearly the extent that it could be, and the substitution of an iron plough for the wooden plough now generally used in preliminary cultivation would result in a saving of at least half the time devoted to this work. This would enable sugar-cane growers to put in much larger areas than they are now doing. The time devoted to weeding and other after cultivation could also be greatly economised. Our

experiments go to show that with moderate manuring the sugar-cane rows can be profitably put four feet apart instead of $1\frac{1}{2}$ feet apart as is now a common practice (see Table IV). With rows four feet apart cane can be intercultivated by bullock power at least till

TABLE IV.

Sugar-cane Spacing Experiments.

Cane crop in tons and jaggery in maunds (28 lbs. each) per acre.

Experiment	Local Pattapatti Cane				Red Mauritius Cane					
	1915—16		1916—17		1917—18		1918—19		1919—20	
	Cane	Jaggery	Cane	Jaggery	Cane	Jaggery	Cane	Jaggery	Cane	Jaggery
Rows 1 foot apart ...	29.5	284	20.1	209	25.28	298	Discontinued		...	...
„ 2 feet „ ...	38.0	364	19.1	221	26.98	314	40.52	407	34.3	313 $\frac{1}{2}$
„ 3 „ „ ...	32.7	315	21.3	233	33.70	334	42.53	419	35.6	326
„ 4 „ „ ...	...	...	...	...	...	...	44.64	429.4	36.2	326 $\frac{1}{2}$

N. B.—All plots were manured at the rate of 30 cartloads cattle manure and 1 ton of Groundnut cake per acre.

it is four months old. Lastly with a harder variety and one less liable to lodge than Pattapatti it is quite possible to do away with all wrapping, another operation requiring a great deal of labour and involving much expense. I believe it is no exaggeration to state that through the use of bullock drawn implements double our present sugar-cane area could be cultivated with the man power which is now being devoted to this work.

Lastly, of course, the labour employed in the manufacture of jaggery both of man and of bullocks could be very much economised

through the introduction of power crushing plants.

The great desideratum of the Mysore Agriculturist is capital. Without this very little agricultural development can take place. The permanent source of that capital must be the crops grown on the land. There is no crop now grown in Mysore which can be made to produce capital so quickly and so abundantly as sugar-cane and there is no period of our agricultural history which has been so favourable for the development of sugar-cane cultivation as the present.

THE WORLD'S SUGAR SUPPLY.*

BY WYNNE SAYER, SECRETARY,
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I. INTRODUCTION.

IT has been very truly said that there are lies, damned lies, and statistics and to such an extent does the truth of the above saying prevail that this article is written with a view to putting before the general public, who may not be familiar with the exact state of things, the facts and figures dealing with the present world shortage of sugar, the reasons for the shortage and the possibility of its continuance. Here in India, while we are not really feeling the acuteness of the situation, like those in England, yet we have the opportunity of realizing that India, despite the fact that she has the largest acreage in the world under cane, still requires to import an amount of sugar equal to the entire surplus of the other British sugar growing dependencies to supply her own needs while England who has no means of supplying her own needs other than that of buying from abroad is now rationed on the most rigid scale (the consumption for 1920 being limited to 1,160,000 long tons) owing to the fact that the extra sugar she requires is held against her at exorbitant rates. This will undoubtedly bring home to England the necessity for organizing her sugar growing dependencies so that such a state of things may not occur again.

When speaking of the world's sugar consumption what is really meant is its sugar production; for although in normal times a considerable quantity of sugar, some 760,000 tons, is carried over the year in stock, yet consumption has expanded to the extent of this margin in the last few years and in consequence the shortage has directly affect-

ed consumers rather than reserve stocks. In order to realize the importance of sugar as a diet among civilised nations and the extent to which its consumption is increasing each year the following table of the world's production of sugar excluding British India may be studied and from the figures contained therein it may be safely said that at no time in the near future is the supply likely to overtake the demand.

TABLE I.

World's Production of Sugar excluding British India.

Year			Total production
			Tons. ¹
1859-60	...	...	1,792,564
1864-65	...	...	1,976,727
1869-70	...	...	2,587,215
1874-75	...	...	3,206,221
1880-81	...	...	3,847,786
1884-85	...	...	4,904,400
1889-90	...	...	5,674,700
1894-95	...	...	8,257,200
1899-1900	...	...	8,291,800
1902-03	...	...	9,372,600
1904-05	...	...	9,646,000
1909-10	...	...	12,765,000
1911-12	...	...	13,349,000
1913-14	...	...	16,302,800
1914-15	...	...	15,920,700 ²
1915-16	...	...	14,021,500
1916-17	...	...	14,028,600
1917-18	...	...	13,976,500
1918-19	...	...	14,081,600

¹ A ton = 2,240 lbs.

² The decrease in the world's production since 1914-15 is due to the war and its after-effects.

* With acknowledgments to the *Indian Trade Journal*.

II. SOURCES FROM WHICH SUGAR IS DERIVED.

Sugar, the sucrose or saccharose of the chemist, is widely distributed in the vegetable kingdom. In a great many plants it represents the most important carbohydrate reserve substance. But sugar-cane and sugar beets are the chief sources from which sugar is manufactured. Certain species of the palm, the maple and sorghum also yield sugar but they are of secondary importance as being responsible for a very small quantity compared with the total output of this product from the two plants mentioned above. It is well known that sugar has been made since pre-historic times from cane which is a native of the tropics and which cannot grow outside a sub-tropical climate. Because of climatic conditions the cultivation of cane by white labour is even yet scarcely possible and was quite out of the question until modern tropical sanitation developed. It should be remembered that every additional ton of cane sugar means either the replacing of inefficient by efficient methods of cultivation or manufacture, or the reclamation of tropical forests to the uses of man. The conditions under which sugar-cane is raised vary greatly in the different cane growing areas of the world. In Hawaii the most modern machinery is used both in cultivation and manufacture. Much of the land is broken with steam ploughs, irrigation on a scientific scale is practised and up-to-date processes of manufacturing sugar are employed. In the favourable conditions of Cuba sugar-cane grows like a weed and very little care is required. On the western side of this island four to seven ratoons are grown while on the eastern side twenty to forty ratoon crops are taken. In Java the cane is planted every year and grown on an intensive scale with scientific skill and care. Sugar-cane cultivated under favourable conditions, *e.g.*, in Java, gives a crop of over 40 tons per acre with a sucrose content of 11 to 16 per cent. Factories equipped with up-to-

date machinery and working under skilled supervision in Java extract about 4.2 tons of sugar per acre. It should be mentioned, however, that yields as high as 7 tons of sugar per acre have been obtained in isolated cases and the application of science and improved processes of manufacture are continually raising the outturn of sugar per acre.

The next principal source from which the world's supply of sugar is derived is beet. The history of beet-root sugar dates from 1747 when the Prussian Chemist, Marggraf, obtained sugar crystals from beets experimentally. The first beet sugar factory was started in Silesia in 1801. Since then the progress of the industry has been very rapid. The cultivation of this root crop has spread practically throughout the countries of Europe and into the United States of America. The most scientific methods have been adopted both as regards cultivation and manufacture and new varieties of the beet, high in sugar content, have been developed. It may as well be made clear here that while the sugar content of beet as now grown is higher than that of cane, the crop is a lighter one. The average yield of sugar beets in the United States is $9\frac{1}{2}$ to $10\frac{1}{2}$ short tons per acre; in Germany $12\frac{1}{2}$ to $14\frac{1}{2}$; Austria-Hungary $11\frac{1}{4}$ to $12\frac{3}{4}$; Russia $6\frac{3}{4}$ to $8\frac{3}{4}$; in short, on an average, under the best conditions, only about 12 to 20 long tons of beets can be grown per acre and thus the yield of sugar seldom reaches 2 tons per acre.* It is, however, a shorter duration crop and is one which can be worked in a most useful rotation.

The progress of this industry, aided on the continent by protective duties and later by the grant of direct or indirect bounties on

* The average recovery of sugar from sugar beets in the United States is 13 per cent to $14\frac{1}{2}$ per cent in refined sugar, equal to $14\frac{1}{2}$ per cent to $15\frac{1}{2}$ per cent in raw sugar; in Germany $15\frac{3}{4}$ per cent to $16\frac{1}{2}$ per cent in raw; Austria-Hungary $14\frac{1}{2}$ per cent to $15\frac{1}{2}$ per cent; Russia 12 per cent to 16 per cent. Truman G. Palmer.

the exportation of beet sugar, was very striking. In 1840 beet sugar was but 4 per cent of the total sugar supply of the world. By 1870 it had become 34 per cent of the total. Between the eighties and nineties it rose to 50 per cent while in the next ten years beet sugar constituted $\frac{3}{5}$ ths of the world's total output of sugar. Towards 1898-99 the dominating position of the beet sugar industry threatened ruin to its rival, the cane sugar industry. As a result of various international conferences the Brussels International Sugar Convention was signed and came into force in 1903. By it all bounties, etc., were abolished and the two industries were placed on an equal footing as regards competition. Since then,

the increase in cane sugar production has been very rapid as will be seen from the table below:—

TABLE II.

World's Production of Cane Sugar excluding British India.

Year.	Tons.
1904-05	4,776,000
1909-10	6,177,000
1911-12	6,548,000
1913-14	7,602,700
1914-15	7,705,100
1915-16	8,041,700
1916-17	8,507,130
1917-18	8,991,250
1918-19	9,686,960

(Willett and Gray)

III. COUNTRIES PRODUCING CANE SUGAR.

The production of cane sugar is widely distributed throughout the areas of the world.

The following table shows the countries and also gives the figures in long tons of cane sugar production during the years 1913-14 to 1918-19.

TABLE III.

	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
Louisiana	261,300	216,700	122,800	271,339	217,499	250,802
Texas	7,000	3,500	1,000	6,300	2,000	3,125
Porto Rico	325,000	308,200	431,300	448,567	405,174	375,000
Hawaiian Islands...	550,000	577,200	529,900	575,510	515,035	535,000
Cuba crop	2,597,700	2,592,700	3,007,900	3,023,720	3,446,083	3,971,766
St. Croix	5,800	4,500	14,800	7,787	5,400	9,000
Philippine Islands, exports..	225,000	243,000	332,200	202,655	216,260	192,000
San Domingo, exports ...	105,800	108,500	126,100	130,171	127,332	158,309
Mexico, crop	130,000	110,000	65,000	50,000	40,000	60,000
Central America	22,000	22,000	35,000	25,000	25,000	30,000
Trinidad	47,300	49,100	64,200	70,891	45,256	47,850
Barbados, exports	33,400	32,600	65,000	55,456	65,230	80,000
Jamaica, exports	15,600	15,100	15,100	28,331	34,300	40,000
Other West Indies	24,000	24,000	35,400	40,000	35,000	29,300
British Guiana, exports ...	103,800	113,600	116,200	101,650	114,007	93,902

TBBLE III.—*contd.*

	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
Queensland and N. S. Wales.	225,000	246,400	159,700	192,831	325,900	226,000
Fiji Islands, <i>exports</i> ...	100,000	102,000	90,000	95,000	70,800	80,000
Egypt, <i>crop</i> (consumed locally) ...	69,400	75,200	99,000	101,832	79,450	82,000
Mauritius, <i>crop</i> ...	249,800	277,165	215,500	209,035	249,400	278,555
Natal, <i>crop</i> ...	85,700	91,600	111,965	125,000	106,250	144,000
Martinique, <i>exports</i> ...	38,700	40,000	39,900	34,443	20,881	30,000
Guadaloupe ...	38,900	40,000	34,100	36,160	28,000	25,000
Reunion, <i>exports</i> ...	35,800	39,300	45,000	42,152	50,000	50,000
Dutch Guiana ...	14,000	12,000	13,000	12,000	10,000	8,000
Java ...	1,345,200	1,303,000	1,198,600	1,596,174	1,778,345	1,749,400*
Venezuela ...	3,000	3,000	7,000	18,428	15,000	15,000
Ecuador ...	...	...	7,600	7,000	8,000	7,000
Peru ...	176,700	175,000	250,000	276,000	265,000	250,000
Argentina ...	280,300	330,000	149,300	87,700	87,700	130,260
Brazil ...	203,400	240,000	194,000	150,050	148,958	260,000
Formosa and Japan, <i>crops</i> ...	204,000	262,000	405,200	436,026	397,618	415,678*
Mozambique, <i>crop</i> ...	34,000	40,000	50,000	55,000	50,000	50,000
Spain ...	13,200	7,400	6,400	4,584	7,040	6,610
India (raw sugar) ...	2,291,500	2,460,600	263,400	2,728,000	3,311,000	2,337,000
Total tons ...	9,894,200	10,165,700	10,675,700	11,235,136	12,302,250	12,023,890

(Willett and Gray.)

* Java in 1919 only totalled 1,335,000 tons and Formosa 289,500 thus reducing the total by 500,000 tons and eliminating the effect of Cuba's increase on world's supply of cane sugar.

In India sugar-cane occupied 2,820,000 acres in 1918-19, but the total production of raw sugar was estimated at only 2,337,000 tons. It should be borne in mind that by far the largest amount of the product manufactured in this country is jaggery, a form of raw sugar, and is consumed as such. Raw sugar as ordinarily understood can be refined at a loss of 7 per cent but the jaggery or raw sugar manufactured in this country is so bad that out of every 100 tons of this product you can get hardly 47 tons of refined sugar, the rest being all molasses and waste. I do not think that figures regarding India's total production of jaggery should be included in the world's figures of sugar production as they merely confuse the main issue. Consumers of this raw sugar (jaggery) in India do not use refined sugar so that even if there is a shortage in this jaggery crop it

does not add appreciably to India's demand for white sugar. She turns out about 125,000 long tons of refined sugar and these figures should be included in the world's total. There is however an increasing number of people who consume white sugar in this country and this consumption is much greater than India's production of this article; hence before the war (*i.e.*, during the five years 1908-09 to 1913-14) she imported on an average 633,500 tons of sugar valued at Rs. 12,50,97,000 principally from Java, Mauritius and Austria-Hungary. On account of the difficulties caused by the war the imports have fallen off. Last year they stood at 506,700 tons valued at Rs. 15,36,81,000. The demand for sugar is however increasing and the imports will show signs of recovery and even advance further if the prices show

some reduction from their present abnormally high level.

Among cane sugar producing countries Cuba with its total output of nearly 4 million tons of raw sugar stands first, next comes Java with over 1,300,000 tons. As the area under cane in Cuba is not estimated to be higher than in India while the acreage under this crop in Java is hardly one-seventh of India's it is pretty obvious that the methods of growing and manufacture in those countries are carried on on more economical and productive lines.

IV. COUNTRIES PRODUCING BEET SUGAR.

The following table shows the beet sugar producing countries of the world and their output from the year 1913-14 to 1918-19.

TABLE IV.

Countries of production	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19 Estimates
Germany	2,676,000	2,524,000	1,575,000	1,477,000	1,541,000	1,441,900*
Austria-Hungary (Czecho-Slovakia, etc.)	1,662,000	1,594,000	924,200	920,400	668,250	700,000
France	768,800	290,400	148,300	203,800	200,265	110,096
Russia (Ukraine, Poland, etc.) ...	1,662,000	1,909,000	1,641,000	1,304,000	1,028,580	700,000
Belgium	225,400	157,500	111,300	132,900	131,000	75,000
Netherlands	227,800	290,400	239,000	261,800	199,300	173,430
Sweden	135,100	151,600	125,300	116,200	125,000	127,467
Denmark	143,400	147,700	123,000	112,200	136,000	144,600
Other European Countries ...	534,300	492,200	295,300	246,100	261,000	255,000
United States of America ...	655,300	646,300	779,800	734,600	682,860	674,892
Canada	10,000	12,500	17,600	12,500	11,250	22,300
Total tons ...	8,700,100	8,215,600	5,979,800	5,521,500	4,985,300	4,394,700

(Prinsen Geerlings and Willett and Gray.)

* More recent data are to the effect that production did not exceed 1,250,000 tons W. S.

In 1913-14 beet supplied 46 per cent of the total sugar crop of the world. Since then it has steadily decreased to date. In 1919 it was only 27 per cent of the total. The principal beet growing countries in Europe are Germany, Austria-Hungary, Russia and France* and outside Europe, the United States of America. All the beet growing countries of Europe have been hit heavily by the war.

In France out of the 206 factories existing before the war only 61 could work in 1919. In all the European countries the indirect consequences of the war have brought about a decline in beet sugar production, *viz.*, scarcity of food stuffs and fodder, shortage of labour, implements and fertilizers, and lack of coal. The output per acre of the planted area and the sugar content have also deteriorated as a result of these conditions. Given favourable circumstances it will be several years before the European beet sugar industry will be able to regain its former position and until the cane sugar industry is able to meet this deficit the world will suffer from a shortage of sugar.

V. THE WORLD'S PRODUCTION AND CONSUMPTION OF SUGAR.

Reference to tables III and IV will show the total world's production of both beet and cane sugar excluding British India† to be as follows :—

TABLE V.

Year			Long tons.
1913-14	...	...	16,302,800
1914-15	...	...	15,920,700
1915-16	...	...	14,021,500
1916-17	...	...	14,028,636
1917-18	...	...	13,976,500
1918-19	...	...	14,081,600§

* These four countries are to be understood to include here all the territory which belong to them before the Great European War of 1914-18

† British India is left out as her main sugar crop excluding her white sugar manufacture of 125,000 tons does not affect the world crop either way but if included merely clouds the main issue.

§ As already mentioned in footnote to Table III, Java fell short by 400,000 tons and Formosa by 100,000 in 1919 which resulted in the world supply of sugar being actually less in that year than in 1916.

Before the war (*i.e.*, during the quinquennium 1908-09 to 1913-14) the principal importing countries of the world were the United Kingdom, (1,811,450 tons), the United States of America (2,603,100 tons), and India (633,500 tons), while the principal exporting countries were Cuba (2,396,700 tons), Java (1,234,500) Germany (662,600 tons), Austria-Hungary (734,100 tons), Russia (203,250 tons), Mauritius* and Belgium.†

Of the exporting countries in Europe, Germany, Russia Austria-Hungary and France have ceased to fulfil that role. Germany's consumption in 1919 was estimated at 1,650,000 tons while her production of sugar was only 1,250,000 tons, leaving a deficit of 400,000 tons to be imported. On account of the great shortage of labour and artificial manures, one hundred and sixteen thousand acres less have been sown in 1919 than in 1918 and she will require this year not less than 500,000 tons as imports if she can pay for them. In Italy the 1919 crop showed an increase of 50,000 tons over 1918 but this was only just sufficient for her requirements. The area planted for the 1920 crop is greater than the acreage in previous years but the removal of restrictions on consumption of sugar may take away the extra quantity.

Crops in Sweden, Poland, and Spain promise to be sufficient for home needs. Norway produces no sugar within its borders and is dependent on imports for its supplies. For the year 1919 the Inter-Allied Council allotted 66,000 tons to meet its needs. Originally Germany, Austria-Hungary, Russia and Java used to supply this but during 1919 the United States of America and Java were laid under requisition. This year 75,000 tons will be required. Regarding Russia no reliable information is available

* Mauritius exported on an average 128,800 tons of sugar to British India alone during the five years 1908-09 to 1913-14.

† Belgium exported 171,740 tons in the year 1913

but in view of the conditions prevailing there any exports are still out of the question. Her pre-war consumption was 1,180,000 tons and production 1,403,000 tons, leaving over 220,000 tons for export. But her total output of sugar in 1919 was estimated at 700,000 tons while this year the estimate is only 350,000 tons. Austria-Hungary's production before the war was roughly 1,400,000 tons with a local consumption of 683,000 tons and thus she was in a position to export over 700,000 tons. But at present the conditions in German-Austria are hopeless. In Hungary where formerly the export of sugar was considerable it is not expected that even one-third of the country's requirements will be produced in view of the utter collapse of her political and economic organization. Only Czecho-Slovakia is in a position to meet its own requirements of 350,000 tons and to report a surplus of 150,000 tons. France used to consume 645,000 tons on an average before the war and her production was 670,000 tons a year. But in 1919 her production fell to 110,000 tons of refined sugar and she imported 440,000 tons. The 1919-20 crop is estimated at not more than 160,000 tons and as the taste for sugar and sugared preparations has considerably increased she will require over 600,000 tons as imports. At the present moment the only countries in Europe able to supply beet sugar in any quantities are Holland, Denmark and Czecho-Slovakia. The first named country (Holland) expects to export 50,000 tons; the Danish crop for 1919-20 is expected to yield 160,000 tons. About 30,000 tons will be available for export as at 130,000 tons the per capita consumption of Denmark is among the heaviest in the world. As regards the position of Czecho-Slovakia the extent of her capacity for exports has been considerably reduced by the unseasonable setting in of severe cold weather, accompanied by heavy snow. Most recent advices put down the crop at 500,000 tons (metric) against 750,000 previously

estimated. From the point of view of net exports therefore we are left with Cuba, Java, and Mauritius as the principal countries to look to, while Germany, France, German-Austria, Hungary and Russia, to the extent to which their finances will enable them to buy sugar must join the importing countries to the tune of some 1,500,000 tons.

Cuba's production was 2,597,700 long tons in the year 1913-14 and her consumption was 200,000 tons but since then her production has increased by leaps and bounds. It rose to 3,446,000 tons in 1917-18, and to 3,971,000 tons in 1918-19 and the crop in 1919-20 is estimated at 4,500,000 tons. It may however be mentioned in passing that this 500,000 tons increase if it eventuates will be swallowed up by those countries who are now rationed, *e.g.*, England who is now short of 700,000 tons on her pre-war consumption alone.

	Long tons.
Cuba's exports in 1914-15 were	... 2,417,524
" 1915-16 "	... 2,850,197
" 1916-17 "	... 2,885,510
" 1917-18 "	... 3,280,798
" 1918-19 "	... 3,834,818

Before the war 94 per cent of her exports used to go to America but since 1914 other countries, especially Great Britain, France and Canada have been taking a considerable portion. Stocks at shipping ports on 15th November 1919, were 180,623 tons against 238,637 tons in 1918 and 22,174 tons in 1917.

Porto Rico and Hawaii export practically all their sugar to the United States of America. Before the war America used to import the greater part of the sugar produced in the Philippine Islands. But the exports to Hongkong, China, Japan and the United Kingdom have since increased. In 1917-18 while the United States of America took 66,421 tons, other countries took 149,839 tons. In 1918-19 while 80,000 tons went to the United States of America, 115,000 tons were shipped to other countries.

Java's production in the year 1913-14 totalled 1,345,000 tons. She exports practically all of her sugar crop, and her exports in 1913-14 were 1,272,410 tons. Her principal customers were India, Hongkong and Japan. Since then European countries have begun to take heavily. This country reached its high water mark of production in 1917-18 when the crop totalled 1,778,345 tons. Her exports rose to 1,688,400 tons in the year 1918-19 (year ended 31st March, 1919). In the season May to November of 1919 her crop totalled 1,335,000 tons. The stock on 1st April, 1919, was 316,117 tons and the 1919 crop brought the totalled supply up to 1,651,950 tons. Of this quantity the exports from April 1st to October 31st, 1919, came to 978,614 tons and the estimated balance of supply on November 1st was 638,336 tons.

In Mauritius the average production for the five years 1913 to 1918 was 252,000 tons out of which 5,904 were used for local consumption, the rest being exported. Exports from 1st August, 1918, to 4th July, 1919, from the 1918-19 crop and the previous year's balance were 260,352 tons against 197,256 tons in the previous year.

Exports were as under:—

August 1st to July 4th.

		(in long tons)		
Destination	...	1918-19	1917-18	1916-17
Great Britain	...	154,135	133,627	7,952
France	...	11,216	...	151,760
Belgium	...	11,431	...	12,028
India	...	70,526	47,528	22,249
Australia...	...	7,094	...	...
Elsewhere	...	5,950	16,101	1,764
		260,352	197,256	195,753

The shipments under "Elsewhere" were mostly to African ports. The 1919-20 crop is estimated at 242,000 tons. An event of primary importance to Eastern markets has been the purchase, by the British Royal Commission, at about £ 50 per ton *f. o. b.* Mauritius of the 175,000 tons of crystal

sugar controlled by the Mauritius Planters' Syndicate.

Turning to the importing countries we will take the United States of America first.

For the five years 1909 to 1913 the United States consumed an annual average of 3,390,000 tons of sugar. During the last ten years roughly half the quantity of her total supplies came from Cuba, one-fourth from Porto Rico, Hawaii and the Philippines, and one-fourth from her domestic production which consists of both cane and beet sugar.¹ The amount which came from other countries was negligible. The United States of America import raw sugar from Cuba and refine it for domestic consumption as well as for export and the average exports of this refined sugar came to 48,800 long tons a year before the war. Since then they have considerably increased, reaching a total of 407,140 long tons in 1918-19. Although the exports have increased the supply of sugar has also so expanded that the consumption has steadily been above the pre-war average. During the first nine months January to September, 1919, 3,263,000 long tons refined sugar was delivered into domestic consumption in the United States of America as against 2,661,000 tons in the same period in 1918, an increase of 22 per cent and this is entirely independent of its exports which came to 504,000 tons including the British Royal Commission's shipments. The net consumption during the whole of 1918, (January to December) was 3,400,000 long tons while for the whole year 1919 it must have been four million tons. In this connection it will be interesting to note that the total production of the United States of America and her insular possessions (Hawaii, Porto Rico and the Philippines) in 1918-19 was only two million and odd tons. The American consumption of sugar has

¹ For the quantity of beet and cane sugar produced in the United States of America reference should be made to tables III and IV.

greatly increased. This is shown in the heavy increased sales of candy, soft drinks, ice cream, etc. Prohibition of the use of beer and spirits, general prosperity of the country and the desire of the trade to lay in stocks at present prices are also factors in the increased consumption. The entire amount of sugar exported from January to end of September, 1919, represented only two weeks' supply for the country as a whole.

Before the war Germany and Austria-Hungary between themselves used to supply over half of the United Kingdom's requirements. On account of the stoppage of supplies from this source during the war Great Britain began to import from Cuba, Mauritius and Java. In 1918 Cuba alone furnished 823,900 tons of sugar, that is, more than three-fifths of the United Kingdom's total sugar imports of the year. In spite of these increased imports from the New World, her total sugar supply decreased from 1,811,000 tons before the war to less than 1,310,000 tons in 1918. The total imports in the first nine months of 1919 however were 1,271,231 tons and consumption during the same period amounted to 1,072,129 tons and she is now rationed to 1,160,000 tons for the whole of the year 1920. It may be mentioned that in 1919 less than 20,000 tons of the total imports of sugar into the United Kingdom came from the continent, over 400,000 tons from Cuba, 225,000 tons from Java, 150,000 from the United States of America, 135,000 tons from Mauritius, and 92,000 tons from the West Indies.

India was Java's principal customer before the war, taking an average of 453,000 tons, *i.e.*, more than a third of the total sugar exported by Java. Since then, however, other countries have come to occupy an important place in Java's export sugar trade, notably Japan and European countries. Japan which took 49,905 tons in 1916, purchased 328,745 tons in 1918, and the

direct result of this was the rise in price of sugar in India, as the sugar which used to go to India was now wanted for China and other countries. Japan bought not only for home consumption but also for other countries, particularly for America on account of the extra amount of tonnage she had available. In 1918-19 India imported 425,200 tons of Java sugar, (363,100 tons coming from Java and 62,100 tons from the Straits Settlements.) In 1919 shipments to Europe increased as the result of the releasing of ships from the war carrying trade.

VI. THE SITUATION AT PRESENT.

The world's total sugar crop for 1919 excluding British India was estimated at 14 million tons, *i.e.*, nearly two million tons less than that of 1913-14 and 1914-15. According to Messrs. Willett and Gray's estimates, if we exclude British India, the world's production of sugar in 1919 was level with that in 1918. But it is well known that in 1919 there was a very severe shortage of sugar and prices touched unheard of figures. This was due to the increased consumption in America and European countries as a result of the relaxation of restrictions on sugar with the cessation of the war and the actual falling off in production in some countries *e.g.*, Cuba's estimated production of 4,000,000 actually came to 3,971,776 tons while Java's estimated crop of 1,700,000 tons came to 1,335,000 tons only. The actual production in Formosa also was only 298,500 tons against the estimate of 415,678 and all this resulted in the serious shortage actually felt in the year.

Messrs. Willett and Gray have published their estimate for the season 1919-20, which is given below.

TABLE VI.
(I) Cane Sugar.

	Harvesting period.	1919-20 tons.
United States-Louisiana	... Oct.-Jan.	¹ 116,000
Texas	... Oct.-Jan.	2,000
Porto Rico	... Jan.-June	426,600
Hawaiian Islands	... Nov.-July	500,300
West Indies--Virgin Islands	Jan.-June	12,000
Cuba	... Dec.-June	4,300,000
British West Indies-Trinidad	Jan.-June	65,000
Barbados	... Jan.-June	70,000
Jamaica	... Jan.-June	50,000
Antigua	... Feb.-July	12,000
St. Kitts	... Feb.-Aug.	11,000
Other British West Indies	... Jan.-June	10,000
French West Indies-Marti- nique, exports	... Jan.-July	30,000
Guadeloupe	... Jan.-July	25,000
San Domingo	... Jan.-June	180,000
Hayti	... Dec.-June	5,000
Mexico ¹	... Dec.-June	² 85,000
Central America	... Jan.-June	30,000
South America-Demerara exports	Oct.-Dec. and May.-June	80,000
Surinam	... Oct.-Jan.	12,000
Venezuela, exports	... Oct.-Dec.	18,000
Ecuador	... Oct.-Feb.	7,000
Peru	... Oct.-Feb.	250,000
Argentina	... May-Nov.	250,000
Brazil	... Oct.-Feb.	175,000
Total in America	...	6,721,600
British India (consumed locally)	... Dec.-May	2,800,000
Java (1920-21, 1,600,000 tons estimated.)	... May-Nov.	³ 1,335,763
Formosa and Japan	... Nov.-June	300,000
Philippine Islands	... Nov.-June	225,000
Total in Asia	...	4,660,763
Australia	... June-Nov.	275,000
Fiji Islands	... June-Nov.	60,000
Total in Australia & Polynesia.	...	335,000

¹ This means a drop of 134,000 tons from the previous year's figure.

² There has been an earthquake which may affect this figure.

³ This has been actually produced in the season May to November of 1919.

	Harvesting periods.	1919-20 tons.
Egypt (consumed locally)	... Jan.-June	90,000
Mauritius	... Aug.-Jan.	242,000
Reunion	... Aug.-Jan.	50,000
Natal	... May-Oct.	150,000
Mozambique	... May-Oct.	50,000
Total in Africa	...	582,000
Europe-Spain	... Dec.-June	6,000
Total cane sugar crops	...	12,305,400

(II) Beet Sugar.

Europe.

Germany	... Sept.-Jan.	1,000,000
Czecho-Slovakia, etc.	... Sept.-Jan.	775,000
France	... Sept.-Jan.	165,000
Belgium	... Sept.-Jan.	125,000
Holland	... Sept.-Jan.	250,000
Russia (Ukraine, Poland, etc.)	Sept.-Jan.	350,000
Sweden	... Sept.-Jan.	150,000
Denmark	... Sept.-Jan.	160,000
Italy	... Sept.-Jan.	150,000
Spain	... Sept.-Jan.	120,000
Switzerland	... Sept.-Jan.	4,000
Bulgaria	... Sept.-Jan.	15,000

Total in Europe ... 3,264,000

United States-Beet	... July-Jan.	800,000
Canada-Beet	... Oct.-Dec.	20,000

Total beet sugar crops ... 4,084,000

GRAND TOTAL—Cane and Beet Sugar 16,389,400

Estimated decrease in the world's pro-
duction ... 29,000

The figures as given above show a decrease in the world's production this year over last of 29,000 tons but this is allowing for 463,000 tons increase of jaggery in British India which does not count; the total supply of the world in 1920 will therefore be some 492,000 tons less than in 1919.

The *American Sugar Bulletin* in its issue dated 14th November, 1919, considered the

first estimate¹ of the 1919-20 sugar crop of the world as published by Messrs. Willett and Gray as conservative and in the light of all the attendant circumstances suggested that the following increases should be made in their figures.

"The Russian crop is shown in the Journal's table as 350,000 tons, which is a decrease of 350,000 tons, compared with last year. This decrease, however, should not be regarded as important, because the demoralized financial and transportation conditions in Russia practically isolate her. Until such time as she again becomes either an importer or exporter, it confuses the world statistics to include her, although it is fair to say that any table of world production should show Russia's estimated yield. Omitting Russia from the calculations is like adding 350,000 tons to the available supply.

"Then the Java crop is harvested between May and November, and this year (1919) was 1,300,000 tons but is shown for 1919-20 whereas the 1920-21 crop will be 1,600,000 tons, and is so shown in the remarks. It is apparent that the 1919 Java crop has been most potential in making a scarcity of sugar in Europe this fall by 400,000 tons (as the previous crop was 1,700,000) and that the 1920 crop will be able to supply to this extent the consumption of the autumn of 1920. But statistically, by crediting the 1,300,000 crop to the 1918-19 crop, and 1,600,000 to the 1919-20 crop, it would seem to increase the world's supply for 1919-20 as compared with 1918-19 by 700,000 tons.

¹The first published estimate of Messrs. Willett and Gray showed the 1919-20 sugar crop of the world as 279,436 tons better than in 1918-19 and the criticism in the *American Sugar Bulletin* is based on that estimate. It may, however, be added that the later estimate showed deficit of 29,000 tons over the figures of 1918-19. It is the revised estimate that has been given above in this article.

P.S.—Since the above was written, it has come to the knowledge of the writer that Messrs. Willett and Gray's latest estimates give the decrease in the world's production for 1920 as 516,339 tons. Excluding British India's increased jaggery production this comes to practically a deficit of a million tons of sugar this year as compared with last year.

"The journal's estimate for Cuba is 4,300,000 long tons while the consensus of opinion among sugar men is that 4,500,000 may be looked for.

"Based on these facts, we find the following increases over those shown in the Journal's table might by some authorities be considered sound.

Tons.

Russia,	35,0000	(account commercial isolation)
Java,	700,000	(new crop instead of old.)
Cuba,	200,000	(consensus of trade opinion)

"In addition to this, the Journal says the consumption of the United Kingdom is indicated at 1,200,000 long tons. This information is, of course, not reflected in the Journal's table of world production but we think it proper to call attention to the fact that any marked decrease in consumption is equivalent to an increase in world available supply. We understand the British estimate is 1,160,000 tons."

We accordingly come to the position that if we exclude British India's increased jaggery production of 463,000 tons in 1919-20 over that of 1918-19, which does not affect the world's sugar position, Messrs. Willett and Gray's estimates show a decrease in the world's supply of sugar to the extent of some 492,000 tons in 1920 as compared with the year 1919. On the contrary according to the *American Sugar Bulletin* even if we omit India's increase of 463,000 tons, the world's available supply of sugar in 1920 will be over eight hundred thousand tons more than in 1919.

It may, however, be mentioned that the position has considerably changed since the above criticism in the *American Sugar Bulletin* appeared and it may be safely said that the situation in 1920 will be no better but rather worse for the following reasons.

The increased cane sugar production is offset by the decreased production of beet-sugar in Europe to the tune of some 600,000 tons. Russia which consumed over one million tons before the war cannot go on with only 350,000 tons and it is even doubtful whether this figure will be actually realized in practice. The decision of the Allies to open trade relations will therefore make it easy for her to import the required sugar if she can pay

for it and as she has surplus wheat, flax, etc., to barter I anticipate no difficulty in her getting sugar from abroad.

It is now pretty certain that Java's production of sugar during 1920 will be 1,562,000 tons, *i.e.*, about thirty-eight thousand tons less than the estimated figure of 1,600,000 tons. The total output of sugar in Formosa will also be reduced by some 60,000 tons as the result of the destruction, by a tornado that swept over the island, of a portion of the growing crop due for harvest in November 1919—June 1920. In the Philippines the crop this year will be 90 per cent of the 1918-19 crop on account of unfavourable weather conditions.

In Cuba even though the cane crop is in an exceptionally fine condition it is possibly unlikely that the whole crop will be put through the mill owing to the prevailing scarcity of labour and it is estimated that the new Cuba crop will amount to 4,446,429 tons. In the United States a new estimate of the domestic beet sugar crop places it at 644,000 tons against the 800,000 previously estimated.

Further the fact that it has been decided in Great Britain, the United States of America and several European countries to continue the control on sugar during the present year points to the world having to face a serious shortage this year and I foresee very keen competition in the world's markets for Cuban and Java sugar.

VII. CONCLUSION.

The dominant facts in the world's sugar situation in 1919 were a shortage of nearly 2 million tons as compared with the output in 1914-15, increasing costs of production and increased rates of transport and it is already evident that the situation in 1920 is to be no better. With the war now over the European populations are increasing their consumption of sugar. The demand from the United States of America is also on the up grade and it is probable the consumption

this year will well exceed 4 million tons while the total production available from the United States of America and its insular possessions will hardly exceed 2,100,000 tons. Consumption of sugar is also increasing in China and the Far East. In view of the high price of this commodity due to the shortage of supplies Governments in various countries are trying to regulate consumption. In England it was announced by the Ministry of Food that consumption in 1920 is to be reduced by half a million tons, *i.e.*, it will be limited to a little over one million tons. In France a proposal to make sugar a Government monopoly is under consideration. In various other European countries restrictions are being imposed not only to meet the existing shortage by limiting the use of sugar but also to prevent the balance of trade from going very much against those countries and aggravating still further the unfavourable exchange rate against their depreciated currencies.

To conclude :—European beet sugar production instead of showing any recovery from the effects of the war will this year be actually less than last year. The shortage of this beet sugar is being partially met by the increase in cane sugar production outside Europe but as the world's consumption of sugar is on the increase great efforts are required on the part of the cane sugar industry to meet the deficit of beet sugar and to supply the normally increasing demand. High prices are thus bound to prevail for sugar until cane sugar production increases to this extent or beet sugar comes into its own again: but the more carefully one examines the situation the more difficult it is to say when this will happen.

Thus a great future opens for all countries who are not faced with insuperable difficulties as regards increasing their output while those countries who spent money in the past in putting their sugar industry on a sound basis are now reaping an ample reward for their energy and foresight.

CO-OPERATIVE LAND MORTGAGE CREDIT FOR INDIA.

BY A. P. SMITH.

AN arresting paper on the subject of Co-operative Land Mortgage Credit for India is to be found in the *Agricultural Journal of India*, Vol. XV, Part 1. The author is Mr. H. R. Crosthwaite, C.I.E., Registrar of Co-operative Societies, Central Provinces and Berar, whose knowledge of the complicated problems of the Co-operative movement in this country is unsurpassed. Mr. Crosthwaite takes for his text the following dictum from the *Wealth of Nations*. "It is not by augmenting the capital of a country, but by rendering a greater part of that capital more active and productive than it would otherwise be so, that the most judicious operations of banking can increase the industry of the country"—a dictum which is undeniable. It is fairly evident to those interested in the co-operative movement in India that it has made, as Mr. Crosthwaite says, "phenomenal progress" since it was started: progress that is not to be minimised by instances of failure here and there due to a legitimate, or imprudent, endeavour to accelerate the pace of progression." This tendency to travel fast is condemned by critics, but the propensity indicates that there is enormous scope for the expansion of co-operation. Co-operation by no means alien to the people who are chiefly responsible, and not the officials directing agency, for the rapid expansion so characteristic of co-operation, notwithstanding some mistakes. Another reason for the phenomenal progress lies in the fact that, owing to sound organization it provides borrowers with credit on reasonable terms, and also offers a safe investment to lenders—a double obligation most serviceable to persons in need of small credit, which is

easily supplied by persons possessing limited capital, thus putting into circulation money which but for the movement would lie unproductive by being hoarded. Mr. Crosthwaite is disposed to treat with scant courtesy critics who hold the opinion that the quality of the co-operative movement leaves something to be desired. He also questions the assertion of condemnatory critics that it is impossible to turn into a means of moral education, co-operative land mortgage, inasmuch as it is a sordid business, and which, for that very reason, should not be attempted. Before forming a definite opinion on the subject Mr. Crosthwaite invites consideration of the political economist to the following questions: (1) "Whether co-operative land mortgage can benefit India, (2) whether, and under what conditions, this particular form of co-operative effort is possible in India, and (3) whether the enormous sums of money which are required for organized land mortgage credit can be found in India." It is unnecessary to follow Mr. Crosthwaite in his lengthy discussion of these questions. The object of this paper is merely to draw attention to the facts recited by him in a publication not generally current among the general public and the conclusions which he draws in his paper which every student of co-operation should make himself acquainted with. Mr. Crosthwaite's experience and knowledge of India and its peculiar conditions, render him an efficient guide in discussing co-operative problems. The answer to the question: "Can co-operative land mortgage benefit India" is—"It undoubtedly can"; and success lies mainly in obtaining sufficient capital for the improvement of agriculture, especially intensive agriculture, for machinery for the adoption of modern methods, the adequate and sustained supply of labour, and a well maintained increase in the country's food supply. Intensive development of agriculture must proceed *pari passu* with industrial expansion, if food prices and wages are to be such as not to prejudice the sale

for it and as she has surplus wheat, flax, etc., to barter I anticipate no difficulty in her getting sugar from abroad.

It is now pretty certain that Java's production of sugar during 1920 will be 1,562,000 tons, *i.e.*, about thirty-eight thousand tons less than the estimated figure of 1,600,000 tons. The total output of sugar in Formosa will also be reduced by some 60,000 tons as the result of the destruction, by a tornado that swept over the island, of a portion of the growing crop due for harvest in November 1919—June 1920. In the Philippines the crop this year will be 90 per cent of the 1918-19 crop on account of unfavourable weather conditions.

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Further the fact that it has been decided in Great Britain, the United States of America and several European countries to continue the control on sugar during the present year points to the world having to face a serious shortage this year and I foresee very keen competition in the world's markets for Cuban and Java sugar.

VII. CONCLUSION.

The dominant facts in the world's sugar situation in 1919 were a shortage of nearly 2 million tons as compared with the output in 1914-15, increasing costs of production and increased rates of transport and it is already evident that the situation in 1920 is to be no better. With the war now over the European populations are increasing their consumption of sugar. The demand from the United States of America is also on the up grade and it is probable the consumption

this year will well exceed 4 million tons while the total production available from the United States of America and its insular possessions will hardly exceed 2,100,000 tons. Consumption of sugar is also increasing in China and the Far East. In view of the high price of this commodity due to the shortage of supplies Governments in various countries are trying to regulate consumption. In England it was announced by the Ministry of Food that consumption in 1920 is to be reduced by half a million tons, *i.e.*, it will be limited to a little over one million tons. In France a proposal to make sugar a Government monopoly is under consideration. In various other European countries restrictions are being imposed not only to meet the existing shortage by limiting the use of sugar but also to prevent the balance of trade from going very much against those countries and aggravating still further the unfavourable exchange rate against their depreciated currencies.

To conclude :—European beet sugar production instead of showing any recovery from the effects of the war will this year be actually less than last year. The shortage of this beet sugar is being partially met by the increase in cane sugar production outside Europe but as the world's consumption of sugar is on the increase great efforts are required on the part of the cane sugar industry to meet the deficit of beet sugar and to supply the normally increasing demand. High prices are thus bound to prevail for sugar until cane sugar production increases to this extent or beet sugar comes into its own again: but the more carefully one examines the situation the more difficult it is to say when this will happen.

Thus a great future opens for all countries who are not faced with insuperable difficulties as regards increasing their output while those countries who spent money in the past in putting their sugar industry on a sound basis are now reaping an ample reward for their energy and foresight.

CO-OPERATIVE LAND MORTGAGE CREDIT FOR INDIA.

BY A. P. SMITH.

AN arresting paper on the subject of Co-operative Land Mortgage Credit for India is to be found in the *Agricultural Journal of India*, Vol. XV, Part 1. The author is Mr. H. R. Crosthwaite, C.I.E., Registrar of Co-operative Societies, Central Provinces and Berar, whose knowledge of the complicated problems of the Co-operative movement in this country is unsurpassed. Mr. Crosthwaite takes for his text the following dictum from the *Wealth of Nations*. "It is not by augmenting the capital of a country, but by rendering a greater part of that capital more active and productive than it would otherwise be so, that the most judicious operations of banking can increase the industry of the country"—a dictum which is undeniable. It is fairly evident to those interested in the co-operative movement in India that it has made, as Mr. Crosthwaite says, "phenomenal progress" since it was started: progress that is not to be minimised by instances of failure here and there due to a legitimate, or imprudent, endeavour to accelerate the pace of progression." This tendency to travel fast is condemned by critics, but the propensity indicates that there is enormous scope for the expansion of co-operation. Co-operation by no means alien to the people who are chiefly responsible, and not the officials directing agency, for the rapid expansion so characteristic of co-operation, notwithstanding some mistakes. Another reason for the phenomenal progress lies in the fact that, owing to sound organization it provides borrowers with credit on reasonable terms, and also offers a safe investment to lenders—a double obligation most serviceable to persons in need of small credit, which is

easily supplied by persons possessing limited capital, thus putting into circulation money which but for the movement would lie unproductive by being hoarded. Mr. Crosthwaite is disposed to treat with scant courtesy critics who hold the opinion that the quality of the co-operative movement leaves something to be desired. He also questions the assertion of condemnatory critics that it is impossible to turn into a means of moral education, co-operative land mortgage, inasmuch as it is a sordid business, and which, for that very reason, should not be attempted. Before forming a definite opinion on the subject Mr. Crosthwaite invites consideration of the political economist to the following questions: (1) "Whether co-operative land mortgage can benefit India, (2) whether, and under what conditions, this particular form of co-operative effort is possible in India, and (3) whether the enormous sums of money which are required for organized land mortgage credit can be found in India." It is unnecessary to follow Mr. Crosthwaite in his lengthy discussion of these questions. The object of this paper is merely to draw attention to the facts recited by him in a publication not generally current among the general public and the conclusions which he draws in his paper which every student of co-operation should make himself acquainted with. Mr. Crosthwaite's experience and knowledge of India and its peculiar conditions, render him an efficient guide in discussing co-operative problems. The answer to the question: "Can co-operative land mortgage benefit India" is—"It undoubtedly can"; and success lies mainly in obtaining sufficient capital for the improvement of agriculture, especially intensive agriculture, for machinery for the adoption of modern methods, the adequate and sustained supply of labour, and a well maintained increase in the country's food supply. Intensive development of agriculture must proceed *pari passu* with industrial expansion, if food prices and wages are to be such as not to prejudice the sale

of the products of Indian industry. Prices will be limited under the influence of trade competition. Agricultural credit therefore is a subject which demands and deserves the closest attention as being the basis of India's future prosperity. Now for the second question—whether and under what conditions, this particular form of co-operative effort is possible in India." In answering this question also it is necessary for the student of co-operation to peruse Mr. Crosthwaite's article. He thus sums up the merits attaching to a mortgage credit association as an agency for providing the land-owner with long term credit, as follows:—

"They enable land-owners to mobilise the wealth represented by their landed possessions by the creation of bonds passing into the general system of securities. These bonds are not, like an ordinary mortgage security, of any restricted currency, but are realizable at any time in the open market. (2) The loans granted are not subject to recall. (3) The rate of interest is as moderate as possible—far more moderate than a borrower could secure if single handed, and he is regulated by the market rate. (4) The rate of interest cannot be raised. (5) The right is conceded to reduce the debt by payments made at the mortgager's convenience. (6) The necessary elimination of the capital debt is accomplished gradually. (7) The costs of valuation and other charges are low. (8) The administration is at once relatively inexpensive and the office holders highly qualified for their work."

The difficulty of organizing and setting at work societies and banks to do all that has been summarized in the foregoing quotation is not lost sight of. But difficulties are meant to be surmounted and it will possibly be necessary for the State to appoint special officers to organize and assist this side of co-operative action. The third question for which an answer is to be found is: "Whether the enormous sums of money which organized land mortgage credit requires can be found in India?" Mr. Crosthwaite expresses the opinion that the question is an administrative one and reasonable and prudent expenditure by the State on practical education—the right kind of education by competent persons—would form the

premium for an endowment insurance which will mature and, in the end, more than recoup the State. Attention towards achieving success, is drawn to the large sums of money which lie unutilized for months in the Government treasuries, to the absorption of vast quantities of gold and silver by the people, and to the fact that Indian exports are much larger in volume than Indian imports. Again, as it is the essential function of co-operative mortgage credit banks to convert funds, which are locked up and are immobile into a form of security which is readily negotiable by being split up into bonds of small denomination, in the possession of numerous holders, landed securities may be converted into a form of exchange like currency notes, backed as they are by reserves of real estate instead of a inelastic reserve. For these reasons, among others, Mr. Crosthwaite is of opinion that there will be no lack of money, for, inasmuch as a system of organized land mortgage is gradually developed, production and consumption will increase and industries and trade will flourish.

With the adoption of such means Mr. Crosthwaite believes in the success of co-operative credit in the various provinces and, in view of the fact that co-operation is not alien to the Indian people, the future of co-operation would be assured provided Government lend their unstinted support, in all possible ways, towards stabilizing credit, providing funds by establishing suitable banks and affording means of practical education to that end. Industrial expansion is as yet an unsatisfied aspiration and agriculture is the mainstay of the people and the Government and it goes without saying that the co-operative movement intelligently engineered and sympathetically dealt with, will go far to release the ryot from the incubus of the money-lender, will facilitate intensive cultivation on modern lines and provide adequate food for India's millions while the slow development of Indian industrial life is being accomplished.

THE TEACHING OF INDIAN ECONOMICS.

By B. G. BHATNAGAR, M.A.,

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WHEN in July last I adopted my new career as a teacher of Economics, I had three definite problems before me and all of them referred to the teaching of Economics in its various branches. By far the most important problem before me was How to teach Indian Economy. Had there been one common method of teaching the subject prevailing in various colleges in these provinces, the problem would have never attracted my attention, but as it is the variety of ways in which it is being taught in the colleges, and at the University, and the great divergence of opinions prevailing here and there as to the best method of teaching it spurred on my imagination to select for myself a method of teaching at once simple and intelligible.

As a student I had gone through two different methods. In a mofussil college, where I read for my B.A., they used to teach it as an independent subject, in the second year of the course, when they had done with the Principles of Economics and this I believe is fairly representative practice of other affiliated colleges in these provinces. The idea is further supported by the clear line of demarcation drawn in the University papers, although in the question papers of the recent years, this tendency seems to be slowly fading away. The method adopted to teach it used to be to dictate notes beginning with the broad physical features of India, in their barest outlines, and without expressing any relations of cause and effect or the complimentary nature of the various regions. Then would follow a mere enumeration of the various agricultural and mineral

products, the kinds of cattle found in India, the names of systems of canals and railways, the number of factories of various kinds, the out-put of coal and iron in India and the desirability of protective tariff. So did end Indian Economy in a mere enumeration, a dull and un-interesting reading, though certainly very emenable to the methods of rote. While here in the University I learnt the basic facts about Indian Economy from a map, and realised the full significance of a Geographic treatment of Indian Economy. The necessity of the study of Indian Geography seems to have been understood by the various teachers in these provinces, as a reference to Indian Geographic phenomena is met with in the notes given by most of them. But still they do not seem to have fully realised the intimate connection between the Geography of India and Indian Economy and still less the importance of treating the subject in a Geographic way. The failure to recognise this important fact seems to have been due to the general misconception of the term Indian Economy, and the undeveloped character of the science of Geography itself.

Students of Economics in India have been labouring up to very recent times under the un-realised and un-realizable hope that at some time or other we shall have developed some general principles or laws peculiar to this country. They thought that the books written by western economists were not applicable to India at all, and that if we wanted to make some real progress in economic thought about India we must discover and develop those peculiar unities which underlie the economic activity of the people of this land. This was the view of that school of economists to which such prominent men as Ranade, Gokhale and many others belonged. But the modern day student of economics in India has begun to realise that the fundamental laws of the science of Economics are quite as applicable to India as to other western countries,

although they need a little modification here and there. In consonance with this changed outlook towards the science of Economics, a change has come to pass in the meaning of the term Indian Economy. If to the old school of economists Indian Economy stood for a collection of laws of consumption, production, exchange, and distribution, peculiar to this country, then to a present day student of economics the term signifies a mass of information statistical and descriptive pertaining to Indian economic conditions and problems and any proposed solution thereof. Thus V. G. Kale one of the leading living Indian economists observes "Indian Economy is not a separate science, because it does not seek to discover new laws. We have indeed to observe things as they are, and describe the economic activities of the various classes of the population, and the different economic phenomena like high prices, low wages and increasing rents, and to point out the relation of cause and effect. But we have also to point out how improvement may be effected by individual or collective action, and how evils may be prevented and remedied. It partakes more of the nature of the art of economics or of a normative science."

Now if we concede that this is the correct way of looking at Indian Economy, and if we at the same time recall to ourselves the modern idea about Geography, then we would be able to realise the importance of Indian Geography in the teaching of Indian Economy. Modern Geography is more than a catalogue of facts, it is also a study of the relationship of these facts. The old idea of Geography was of teaching what and where, the modern Geography also answers why. The relation of cause and effect is also recognised now in Geography. A modern student of Geography also traces the results or influences on economic, social and other activities of the people living in a geographic unit. Modern geography lays great stress upon the human side of geography, and

seeks to explain the relations of human life to earth, *i.e.*, it now asks what is the significance of the various geographic data such as rivers and mountains to man or we may say it attempts to answer how the various geographic features of a certain country have influenced the activity of the people there. Modern Geography then is the study of the earth and man as related to each other, and not a description of the features of earth alone. It studies the features of the earth so that the people may be understood, and the future possibilities of utilisation of environments to increase the well-being of men may be discovered.

From the above discussion of the nature of the two subjects, it would have been made clear that two branches of Indian Economy lend themselves pre-eminently to geographic treatment. One where it seeks to describe the various Indian Economic phenomena, such as the distribution of population, the distribution of crops, the existing development of industries and the varied habits and efficiency of the people. And two where it seeks to propose solutions of certain economic problems in India such as the economic distribution of crops after the introduction of the means of communication, the possibilities of the development of certain industries in certain parts of the country, the possibilities of developing hydro-electric works and the laying out of the means of communications. All of these can be taught by the method of notes and rote as they are being done now in most of the colleges, but it is an unreal, lifeless and impractical method wherein it is difficult for the student to remember things for any considerable time and wherein it is thoroughly impossible for him to make any practical use of his learning in after life. All these things should be taught with reference to a map, pointing out cross references of environments in the delineation of present facts, and the explanation of proposed changes. To illustrate myself. Suppose we want to teach the

distribution of crops, then it is not enough to give an inventory of the various crops, raised in India in different parts and different seasons, but the reasons why they are grown in particular season, and a particular place should also be explained, and that can best be done by means of a map, where one can touch at the nature of the soil, the character of the rainfall, and the influence of the means of communication, all at a time, and point out that such a crop is the resultant of such and such natural environments, and that given those environments one should expect that crop to be predominant there. Then again while dealing with the distribution of population we should point out the determinant influence of the soil, the climate, the rainfall, the means of communication, and other industrial phenomena that are important in this connection, and this is best done by the help of a map where all these things are present in a common perspective. The student can see all things at a glance and realise their influence on the central point in a single view.

By adopting this geographic treatment of this subject, the student learns not only what he is expected to learn from notes, but something more, and in a shorter time and with a greater surety of longer retention than in the previous method. He learns to argue out for himself the relations of cause and effect, and is helped a great deal in cultivating broad and logical outlook, a thing very much to be desired, in our students.

But there is a still greater importance of the geographic treatment of Indian Economy in its other sphere, where it seeks to find out possibilities of economic development in India, and where it proposes to put forward definite proposals for attaining to definite ends. It is almost impossible to deny that industrial development primarily, though not exclusively, depends on matters described in geography—the natural products of a country, the character and efficiency of the people and the means of communication, which afford

facilities for trade and determine the extent of the markets. If we grant as I believe we should that destinies of men are very largely determined by their environments, then the importance of the study of environments, will not be difficult to realise. Although human effort modifies the environments to a certain extent, yet the modifications achieved so far have not been very startling, and there is no hope of man's getting away completely from his 'surroundings.' The beginnings of economic activity, have always been determined by surroundings, and it is only in advanced stages of economic development, that man succeeds to a limited extent, in modifying his environments to suit his needs. Men's power over nature being limited, it is desirable from economic point of view to adapt his activity to his surroundings, to utilize natural forces to their best advantage and hence the importance of a close study of natural environments before we start on any industrial venture. If we go through the history of various unsuccessful enterprises in India, we would come to know that 90 per cent of them failed because of ill-judged location, a mistake which an entrepreneur having gone through this sort of study will certainly not make.

From what I have said above it would have been made clear that the geographic treatment of Indian Economy is a thing very much to be desired and I hope that members of this Conference will see their way to adopt it. By this method a student not only is likely to learn things easily and quickly as I have said above, but this method helps him very much in acquiring a habit of picking up information about things from his environments for himself. "The cultivation of the map habit of thought is no less pregnant in the sphere of economics than it is in the sphere of strategy."

A COMMITTEE ON CO-OPERATION FOR MYSORE.*

BY RAJASABHABHUSHANA RAO BAHADUR
M. SHAMA RAO, M.A.,

*Inspector-General of Education in
Mysore (Retd.)*

I thank the Government of His Highness the Maharaja for nominating me as a member of the Legislative Council as thereby I have gained an opportunity of bringing forward this resolution on the appointment of a Co-operative Investigation Committee for the benevolent consideration of the members of this council. There was a time when it was with very great reluctance that I took up the post of the Registrar of Co-operative Societies when it was first instituted by Government in the year 1905. The scheme of Agricultural Banks which were really co-operative societies under another name and which had been generously instituted by His Highness the late Maharaja Sri Chamarajendra Wadiar of revered memory had not, for one cause or another, fulfilled the expectations of success formed of the scheme and the Co-operative Regulation passed in 1905 was expected to share the same fate. Fortunately in His Highness the present Maharaja we had a born co-operator, one who realized the beneficent potentialities of co-operation long before any results could manifest themselves and but for whose ever watchful care, personal support, and financial help the development of co-operation would not have been what it has now attained to.

Sir, as years have gone on, I have come to believe that among all the beneficent measures initiated in India after the advent of British rule, the future historian of India

will give a very high place to the co-operative movement. Ever since its inauguration in British India, the Supreme Government and the local governments have manifested extreme solicitude in its spread with the result that at the close of the year 1918-19, there were altogether 30,000 societies working in different parts of the country with a membership of 13,000,000, and a working capital of a little over Rs. 15,00,00,000. The loans granted amounted to the extent of Rs. 6½ crores and the profits made to 46½ lakhs of rupees, and the reserve fund amounted to nearly a crore and a half of rupees. These huge totals are, as Mr. R. Ranga Rao, our present Registrar of Co-operative Societies, has remarked in the last number of the *Mysore Blue Book Journal* somewhat difficult to comprehend, and the progress made can be more easily understood if I give the averages that Mr. Ranga Rao has given. For the whole of India, there was at the close of 1918-19 one society for every 8,022 of the population. It had a membership of 46, a share capital of Rs. 875, and a working capital of 5,120. It gave loans to the extent of Rs. 2,411 and made a profit of Rs. 164. The reserve fund accumulated by it amounted to Rs. 449. In our own State, the average population per society was 4,709 and the average membership per society 68, with a working capital of Rs. 5,757 per society and a reserve fund of Rs. 360. The average loans per society amounted to Rs. 4,400 and the average profits to Rs. 274.

So far, we may congratulate ourselves that Mysore has held a prominent place among the different provinces and states of India and that a scrutiny of the figures relating to the annual rate of progress indicates that there is no relaxation of effort to make co-operation as successful in Mysore as in British India, if not more. If any proof is needed to show how useful the Co-operative movement is, and once successfully planted, how strongly it can take root, I have only to mention that in Russia, with all the horrors

*A speech delivered before the Mysore Legislative Council.

of the recent great war and with all its unsettlement, the co-operative movement was able to establish a University of its own in that country. I may also cite that the Supreme Council of allies announced a few days ago that while willing to raise the blockade of Russia, they could consent to trade being opened with that country only through co-operative societies. In short, it appears to me that the sphere of co-operation is as wide as the sphere of economic life itself and the more widely it is spread, the larger will its benefits grow in ever-widening circles. I may also refer, though this occasion may be considered not a fit one for the purpose, to the incentive it is sure to give to the public life of the country. Our president referred in his opening speech to a feature of the district elections for membership to this Council. The figures published show, as he remarked, in the official Gazette, that out of a total of 21,953 voters, only 5,694 came forward to vote, a number slightly over a fourth of the total number of voters, while almost three-fourths could not be induced to go to the place of polling. This unfortunate indifference may be largely attributed in Mysore as in British India to the extinction of the old communal village life. But there is every hope that with the experience gained of the working of co-operative societies, there will be a revival of the old communal spirit both in rural as well as in urban areas and that co-operation will be a powerful ally in the future in making the new Reform Scheme a success in British India.

Already Lord Willingdon and the Legislative Council in Madras, seem to have realized this aspect also of the co-operative movement and have allowed a provision of two lakhs of rupees in the Budget for the next official year and within the next two years a very large number of societies, about 4,500, especially Agricultural and Industrial, for which the Registrar has a scheme ready, are to be established. A sum of $4\frac{3}{4}$ lakhs of rupees has also been provided for loans to

Co-operative Societies for house building in Madras. I am sure that we in Mysore will not like to fall behind our neighbours and be ungrateful to the memory of Sri Chamara-jendra Wodiar, in whose time, long before co-operation as a means of affording relief to the rural agriculturists, was thought of in British India, the scheme of Agricultural Banks, which, as I said, are only co-operative societies under a different name, was instituted. It is supremely necessary, therefore, for us to strengthen the hands of the Registrar and of his co-adjutors and enable them to take a forward stride along with their brethren in British India.

The world-shortage of food supplies, of the raw materials and of appliances of industry and the appreciation of currency have made the problem of normal economic life very acute for almost all classes of people and it has become incumbent that any solution which holds out a prospect of affording relief even to a small extent should be readily grasped. The high prices of food grains are considered to largely benefit the cultivators of lands, but it must be conceded that to the extent they are purchasers of articles other than food grains, this benefit is discounted by their having to pay higher prices than before in common with others. Further, the position of the rural borrowers when they happen to have contracted to pay interest in the shape of grain instead of in money, is really to be deplored. I am not one of those that subscribe to the belief that money-lenders are all blood-suckers ready to pounce upon their victims and suck their blood to the last drop. On the other hand it may be accepted that in a very large number of cases they show consideration to the borrowers, though forced at times to make up for their losses by demanding higher rates of interest than they could have done if all their advances readily came back to them according to the terms of their bonds. Still, it must be said that the lot of a borrower from professional money-lenders is not usually an enviable

one and in these days though the prices of grains are abnormally high, it cannot be said that the rural borrower who has contracted to pay interest in the shape of grain has all the benefit of the ruling high prices to himself. I need not say that the rates of interest payable in money have also increased and attempts at commutation of grain-rates to money rates are not likely to much benefit the rural borrowers. Taking the Statistics of the Registration Department, I find that the number of mortgage deeds in the year 1918-19 was even higher than in the preceding year, 53,463 against 51,461 valued at Rs. 1,36,00,000 and Rs. 1,34,00,000 respectively. It is doubtful, therefore, whether the additional rupees that the high prices are supposed to have given to the agriculturist have really gone towards the reduction of his debt. To add to the difficulties of rural agricultural economy, there is constant subdivision of lands, thereby causing much wastage of labour and weakening the incentives to efficient cultivation. No doubt the Government have laid down certain minima of extent for these sub-divisions but it is within the knowledge of all that the Shanbhog still continues to be in the confidence of the ryots of his village and that through his help many unrecognized and unrecorded divisions take place almost every day. Dr. Coleman, the Director of Agriculture, has already spoken strongly on the disadvantages resulting from too frequent fragmentation of cultivable lands and I believe that an efficient co-operative society in a village will be able to greatly minimise the evils of a system of equal partition of agricultural lands, by inducing combination among contiguous landholders and thereby enabling them to adopt better methods of cultivation and to raise larger and better paying crops. We have next a very large number of artisans and smaller handicraftsmen who are being driven more and more to become agricultural labourers on account of outside competition and

there is also the large class of small traders. In these classes, co-operation may be said to be still almost incipient and yet its advantages to them cannot be exaggerated. We have also to consider the interests of a few other classes who own no lands and whose incomes are derived either from their professions or from the appointments they hold in Government or other offices. The life of these people, especially of the middle class people who are forced to live in towns like Bangalore and Mysore with inelastic incomes has become very hard and in their case also relief is necessary. The Punjab Government has already given an increase of 20 per cent to the salaries of all non-gazetted officers and in Madras a committee is sitting to revise the salaries of officials. Whatever relief may be given in the shape of increase to salaries, with the growing cost of the necessaries of life and with ever-growing house-rent, the benefits of such relief cannot be lasting; and a Government which inasmuch as its revenues are fixed in rupees, suffers equally with the people by the depreciation of the currency cannot be expected to show ready practical sympathy every time there is a complaint of hardship from rising prices or crowded house-accommodation.

How far co-operation can be helpful to solve these problems of life it appears therefore necessary to investigate carefully and broadly. It is true that we have the reports of certain investigations made in British India and that we can benefit by them. Sir, I quite agree that to a certain extent, these reports are valuable to us inasmuch as they afford general directions for our guidance. I cannot, however, accept them as affording all the information that we want and as obviating the necessity of all local investigations. For instance, we have the report of the Merclagan Committee on Co-operation which may be said to be a monumental work, useful for the guidance of all co-operators. This report is, however, based on investigations made in British India and

on information supplied by the witnesses examined with reference to the conditions prevailing in their own parts of the country. Some members of the Maclaughlin Committee paid a visit to Bangalore also but it was a hasty visit and my friend, Mr. M. A. Narayana Iyengar who was the Registrar of Co-operative Societies at the time and whose unwearied zeal greatly popularized the movement will bear me out when I say that a cursory talk for an hour or two with a few of the prominent co-operators of Bangalore at a meeting arranged in the Registrar's office was all that took place and that none of those assembled at the meeting ever took the meeting with any degree of seriousness.

Yet the investigation of these problems is, as I have said, urgent and pressing and hence it is that I have taken the liberty of proposing to this council the desirability of recommending to Government the appointment of a Committee of investigation. This investigation should, in my opinion, apply equally to the human material needed for the efficient organization and supervision of the co-operative movement as to the condition needed for the successful development of industrial, agricultural and other forms of co-operation, to the reduction of the pressure of indebtedness on agricultural lands, the establishment of societies for small traders and artisans, for supari-garden owners in the malnad, and for cocoanut growers in Tiptur and other parts, to the supply of dairy and other products, to the establishment of Co-operative stores for the benefit of the consumers, to the forms of co-operative societies best suited for the malnad ryots, to the problems of housing so as to relieve overcrowding in the existing houses and so as to arrest future insanitation in the new houses which may come into existence. In fact, there are no spheres of life, as I have already said, where co-operation cannot be used as a powerful instrument for the uplift of the people living in such spheres but at the same time it must be acknowledged that the problems confronting those who work in the co-operative field are some of the most difficult problems that their

brains can tackle and behoves us to provide readily to their hand every kind of assistance that can possibly be devised. Mr. Chandy, the present Revenue Commissioner, will, I am sure, confirm my statement as to the difficulty of several of the co-operative problems for, during the short period that he was Registrar, he signaled his office by starting an investigation as to actual relief that the co-operative societies working till then, had afforded to their members. I do not know whether this investigation is being continued or how far it has reached. There can be no denial, however, as to the usefulness of the inquiry instituted by Mr. Chandy. The inquiry indicated that while the amount of the indebtedness of the persons examined remained practically the same, the conditions attaching to that indebtedness altered materially for the better. Out of the 20 lakhs and odd due to money-lenders, nearly half, it was found, had been paid up and that in place of the high rates of interest and of the onerous conditions under which advances had been made, reasonable rates of interest and easy conditions of repayment were found substituted. It was also found that the borrowers after they became members of co-operative societies had ready means of carrying on their agricultural operations and that they had actually increased their assets from 91 lakhs to 107 lakhs. It should be remembered, however, that this investigation related to only 180 out of the total of 1,097 societies and to 8,200 members out of a total of 81,168 members. It will be no surprise to me if the present Registrar has fought shy of continuing an investigation which involves stupendous labours and which needs a very efficient, well trained and adequate staff of officers to arrive at fairly correct results. Mr. Chandy's investigation, however, goes to illustrate the truth of the Kannada proverb that while we have butter on hand, we are wandering to find ghee. If only the rate of interest could be covered by even a single per cent, if only we could increase the yield by a single seer per gunta of land there will be a large accession to the rural wealth of the country and money can be easily found for not only education but also for other improvements.

If the Government are pleased to accept the recommendation now made for the appointment of a committee, the committee should be able to visit all the important centres in the State, examine witnesses,

see how far the existing co-operative societies fulfil the functions assigned to them, and what impediments stand in the way of a larger and more rapid development of these societies. The annual conferences of co-operators arranged by the Registrar both at district head-quarters and during the Dasara at the capital have already afforded some indication of the lines on which investigation should proceed. But pressed for time as such conferences are, their deliberations and conclusions lack authoritativeness and can at best be taken only as mere data for further investigation. A deliberative body of persons, possessing expert knowledge and adequate training, who can approach their subjects with fresh minds and without any preoccupations will, we may feel certain, be able to conduct their investigations in a thorough manner and produce a report the value of which cannot be gainsaid both as a record of reference as well as for inspiration for the wider spread of this movement in particular parts of the country or in particular spheres of activity. At present, for want of such a report dealing with the actual conditions of the Mysore State and embodying suggestions as to the lines on which societies started should be conducted, it has been found that many persons who are really in earnest to associate themselves with the Co-operative movement are forced to hold back on account of their inability to obtain a clear vision as to their procedure when they enter the co-operative field. I may also say that the appointment of a committee, the visits of the members to the several parts of the State, their examination of witnesses and the open manner of their investigations, will go a very great way in arousing public interest and arresting public attention which in themselves will serve as great incentives to the more rapid growth of the co-operative movement.

With these words, Sir, I beg to commend my resolution for the kindly acceptance of the members of this council and conclude with the hope that each one of us, though it may be only like the humble squirrels which are popularly said to have each contributed a few grains of sand for the building of the great bridge over the ocean that Rama is said to have built to cross to the island of Lanka, will contribute his share of support to build up the co-operative structure which His Highness the Maharaja has so anxiously started for the benefit of his subjects.

BANKS IN INDIA.

BY THE EDITOR.

MR. Findlay Shirras' statistical tables relating to Banks in India for 1918, just issued is a document of some interest. We do not propose to review at length here the introductory memorandum which is prefixed to the tables, interesting as it is, but only desire to draw prominent attention to certain points brought out by a careful study of the tables. The map issued with this statistical survey deserves more than a passing mention. In it, those interested in the utility of Banks will find considerable food for study. The distribution of almost every description of Banking in India is shown in it. It is a thoroughly graphic representation of the distribution of all existing Banks in India, and their branches and agencies. One thing that the reader is struck with is the large space still left blank in the map of India, from the banking of India. When we turn to the tables, we see how true this impression is. The number of towns in India in which banks and their branches are situated is 176, or 25 per cent of the total number of towns in India having each a population of 10,000 and over, according to the Census of 1911. There are 75 towns with a population of 50,000 and over. In 59, or 79 per cent of these towns there are banks. In the remaining 16 towns there are banking facilities. There are altogether 96 head offices and 322 branches. The Presidency Banks of Bengal, Bombay and Madras have, besides their head offices, 68 branches and agencies. The Exchange Banks working in India have 48 branches and agencies and the Indian Joint-stock Banks (including the Bank of Mysore, Bangalore) have 93 head offices and 206 branches and agencies. The last of these may be dealt with a little further here. These are, speaking generally

scattered chiefly throughout the North-west of India, especially in the Punjab and the United Provinces. The tables included in this volume deal with only those banks (47 with 197 branches) which have a minimum paid-up capital and reserve of one lakh of rupees. These banks are sub-divided into two classes, namely, (i) those with a paid-up capital and reserve of 5 lakhs and over, and (ii) the more or less pigmy banks with a paid-up capital and reserve between one lakh and less than Rs. 5 lakhs. The aggregate paid-up capital and reserves of these 47 banks in 1918 amounted to Rs. 6,65 lakhs, the deposits to Rs. 42,15 lakhs and the cash balances, to 985 lakhs. That shows the leeway that has still to be made up, if Banking is to achieve in India what it has in every part of the civilized world. The patriotism of a banking has still to be created in India, but that can only come into existence when the facilities for bank are bettered in

this country. This remark holds good despite the fact that there are the Post office, Co-operative and in our own State, the State Savings Banks. According to the tables published in the volume, the first two of these did good work in 1918. The Post office Savings Banks had over a million and a half depositors and about Rs. 19 crores or over £ 12 millions sterling on deposit. The capital and reserves of the Co-operative Credit Banks, registered under the Co-operative Societies Act amounted in 1917-18 to Rs. 3½ crores and the deposits (including loans held by the Banks) to Rs. 11 crores. According to a statement (Appendix I) appearing in this volume the Bank of Mysore, besides its head office at Bangalore, had, in 1917-18, branches or agencies at Channapatna, Chikmagalore, Davangere, Mysore, Shimoga and Tiptur. Its progress during the past five years is thus set down in table 17:—

(Figures in thousands)

Year	Paid-up Capital	Reserve and Past	Total	Deposits					Cash Balance
				Fixed	Savings Bank	Current	Other	Total	
1914 ...	9,90	...	9,90	...	...	...	...	15,68	10,60
1915 ...	10,00	50	10,50	19,10	63	8,27	...	28,00	17,92
1916 ...	10,00	2,01	12,01	28,42	1,05	10,91	51	40,89	12,87
1917 ...	10,00	2,51	12,51	43,39	93	16,62	...	60,94	15,00
1918 ...	10,00	3,50	13,50	45,13	1,16	25,67	11,60	82,96	24,51

That shows steady progress no doubt but that a great deal more requires to be done to popularize sound banking in the State cannot be gainsaid. Now that the Presidency Banks are adding to their strength by amalgamating, it is necessary that the Chief local Bank run on Joint-stock lines should

be enabled to augment its paid-up capital and its reserves and rest, in order that it may attract more deposits and open further branches and agencies, in order that trade and commerce may be given the aid that they deserve.

A NOTE ON THE DEPRESSED CLASSES OF MADRAS PRESIDENCY.*

BY G. F. PADDISON, M.A., I.C.S.,

Commissioner of Labour, Madras.

The depressed classes have been divided by the Government of India into—

- (a) Aboriginal and hill tribes,
- (b) Criminal tribes,
- (c) Untouchables.

The first difficulty that presents itself in discussing the past and still more in considering what has to be done in future in regard to these classes is that it is by no means easy to discover exactly what tribes and castes should be placed under each or any of these categories. The Dombs for axample show distinct criminal tendencies, are out-caste and it is doubtful whether they should not be classed as a hill tribe if not as aboriginal. They are not however included at all in the lists compiled in G. O. No. 1676, dated 2nd December, 1919, from the reports of Collectors, whereas the Pano who is probably simply a Domb under another name is concluded as a hill tribe but not as an untouchable. The Paidis who are Dombs under Telugu names, are not included at all. The Yerukalas and Yanadis whose claims to be considered aborigines are very doubtful and the Malayalis who are admittedly somewhat recent emigrants from the plains are included as hill tribes, whereas such well-known aborigines as the Gadabas, the Gonds or the Konda Doras are not included at all. The Poraja is shown as a hill tribe, but it is more than doubtful whether this is a separate tribe and its members should not be classed under Gadabas, Khonds, etc. The Irulas are included under hill tribes in

Coimbatore and North Arcot. The total population of the Irulas for the Presidency is over 100,000, but of these, only 2,300 are shown in the last census as speaking the Irula language, and only 5,400 are entered as animists. The Irulas of Chingleput are far more civilized than the forest dwellers of the Nilgiris. Mr. Thurston found great difference in the characteristics, even physical characteristics of the domesticated Irula and his jungle relations. So with the Kurumbas. Out of 144,000 only 3,000 speak the Kurumba language, and only 700 are shown as animists. Perhaps the most startling instance is that of the Reddis or Kapus, the largest caste in the presidency—"the great landholding body of the Telugu districts who are held in much respect as substantial steady going yeomen and next to the Brahmans as the leaders of Hindu society." Yet of these no less than 6,400 are shown as animists in the census report of 1911. Probably these should be included under the Konda Doras of Vizagapatam who are sometimes known as Konda Kapus. Some of them may be accounted for by the Konda Reddis of Godavari Agency who are said to be allied to the Koyas. The matter is not merely of abstract importance, as certain privileges are attached already to the backward classes or castes and to the panchamas by the education and co-operative departments and these privileges may be extended. Untouchability would, it would seem, be easy enough to check. But a real difficulty occurs in the case of the Indian Christian who by his conversion to Christianity has lost his claim to be a Panchama. It is certainly hard that he should have to pay more for his privilege because he has changed his religion, or only be granted such privileges on claiming to be an out-caste from a religion which has ceased to be his own.

The following tables show as far as it has been possible to collect them,

I. first, the aboriginals and hill tribes

*Note issued by the Government of Madras, (Rev. Dept.) on 8th March, 1920.

in the presidency whose claim to the title is undoubted ;
 II. secondly, those tribes or castes of which some may undoubtedly

be included but perhaps not all ;
 III. thirdly, those whose claim to be included at all is uncertain.

TABLE I.

Names of tribes				District				Population.
Khonds	...	...	...	Ganjam and Vizagapatam	...	...	...	3,54,940
Savaras	...	...	...	Do	...	...	...	1,86,128
Porojas	...	...	...	Vizagapatam	...	...	...	92,737
Jatapus	...	...	...	Do	...	...	...	92,520
Konda Doras	...	...	...	Do	...	...	...	89,775
Koyas	...	...	...	Vizagapatam and Godavari	...	...	...	79,422
Gadabas	...	...	...	Vizagapatam	...	...	...	45,115
Badagas	...	...	...	Nilgiris	...	...	...	38,180
Paniyans	...	...	...	Nilgiris and Malabar	...	...	...	34,574
Gonds	...	...	...	Ganjam and Vizagapatam	...	...	...	25,596
Vettuvans	...	...	...	Malabar	...	...	...	20,196
Kurichiyans	...	...	...	Do	...	...	...	9,722
Chenchus	...	...	...	Kurnool	...	...	...	7,449
Palaiyars (or Puliyans)	...	...	...	Coimbatore and Madura	...	...	...	4,315
Malasars	...	...	...	Coimbatore	...	...	...	4,199
Karimbalans	...	...	...	Malabar	...	...	...	2,898
Mavilans	...	...	...	Do	...	...	...	2,517
Kattu Nayakans	...	...	...	Do	...	...	...	2,475
Sholagars (including Panirs)	...	...	...	Coimbatore	...	...	...	1,944
Paliyans	...	...	...	Madura, Ramnad and Tinnevelly	...	...	...	1,452
Mudugars or Muduvars	...	...	...	Coimbatore	...	...	...	1,210
Kotas	...	...	...	Nilgiris	...	...	...	1,163
Kanis (or Kanians)	...	...	...	Tinnevelly	...	...	...	1,074
Kadars (or Kadans)	...	...	...	Coimbatore	...	...	...	791
Todas	...	...	...	Nilgiris	...	...	...	748
Arunadans	...	...	...	Malabar	...	...	...	182
Total								1,101,322

TABLE II.

Names of tribes				District	Population
Kapus (or Reddis)	...	...	...	Vizagapatam and Godavari	2,678,925
				(Animists)	(6,376)
Kurumbas	...	...	...	Coimbatore, Nilgiris and Malabar	1,44,095
Do (language)	...	...	...	.....	(3,031)
				Animists	(689)
Irulars	...	...	...	North Arcot, Coimbatore and Nilgiris	1,00,659
Do (language)	...	...	...	.....	(2,358)
				(Animists)	(5,381)
Bagatas	...	...	...	Vizagapatam	33,021
				(Animists)	6,477
Melakudis (or Kudiyans)	...	...	...	South Kanara (includes the Kudiyas in the plains)	4,120

TABLE III.

Yanadis	...	...	...	Guntur, Kistna, Nellore, Cuddapah and Telugu districts generally	1,21,549
Yerukalas	...	...	...	All over the Presidency	88,241
Panos	...	...	...	Ganjam and Vizagapatam	71,323
Dombos	...	...	...	Do	62,976
Malayalis	...	...	...	North Arcot, Salem and Trichinopoly	63,487
Lambadis (or Sugalis)	...	...	...	Guntur, Anantapur, Cuddapah and other Telugu districts	49,418
Paidis	...	...	...	Gunjam and Vizagapatam	48,610
Total					5,04,604

Out of 1,101,322 in the first table over 1,000,000 come from Ganjam, Vizagapatam and Godavari agencies. This forms a continuous area of 20,000 square miles at an average height of about 2,000 feet in the eastern ghats in the north of this Presidency adjoining the Central Provinces and Orissa. No less than nine different languages, Telugu, Oriya, Khond, Gadaba, Gondi, Konda, Koya, 'Poroja' and Savara, are spoken in this tract. The country is administered by the Collectors of the three districts, here styled Agents to the Governor, who

have in addition large areas in the plains or ordinary tracts to supervise. There are three sub-divisional officers whose divisions are entirely in the agency tracts and others are only able to devote part of their time to the agency portion of their divisions. There is no doubt that one at least of the impediments to the development of these tracts has been the comparatively small time and consideration which the heads of the districts are able to spare for this important part of their labours. Moreover the tract is extremely malarial and infested with wild beasts and

most of the hillmen carry battle-axes with them which they are not afraid to use on provocation. It is not therefore surprising that service in these tracts is extremely unpopular with subordinate officials of the plains. The question of remedying this defect by reducing the size of charges and as far as possible making these charges self-contained is under the consideration of Government. This would of course involve a considerably increased expenditure which could not be met by any equivalent increase in Land Revenue as the greater part of the area is comprised in permanently settled zamindaris, and the area to the north of Ganjam which is directly under Government is chiefly occupied by the Khonds from whom no Land Revenue is now levied. On the other hand there is a possibility of discovering valuable minerals, there are great possibilities of hydraulic power, and the forests which ought to conserve the head waters of the streams on which the plains rely for their irrigation might be saved from destruction. This is of the greatest importance, as the rivers are rapidly being silted up to an alarming extent and nothing but the personal influence of a man who is in continual contact with these wild tribes and thus gains their confidence can have effect in inducing them to refrain from the wanton destruction of the forests. How much can be done by the right man has been shown by Mr. Welchman among the Savaras of the Parlakimedi Hills, by Mr. Bennett and Mr. Minchin among the Khonds of Pondukhol and by Mr. Harris in Hill Madgole; over the borders in Orissa, Mr. Ollendorf the Sub-divisional Officer (the area of whose charge is not a quarter of the areas under the Divisional Officers in Ganjam) has been able to induce the Khonds to forswear strong liquor, to grow potatoes on a large scale as a profitable crop (Mr. Vernon in Vizagapatam made a similar effort some years ago but was transferred before his experiments could take root), and has generally become looked

up to among the Khonds as the father of the people. Special efforts have been made recently by the Madras Government to open up and to develop these agency tracts. A special Malaria Officer was appointed though his place had to be kept vacant during the war. Measures have been taken to make the head-quarters of the Vizagapatam Special Assistant Agent and other places in that agency more habitable by draining the malarial swamps. Large sums have been allotted in recent years for the creation and improvement of roads and bridges. The railway from Vizagapatam to Raipur will pass through the Agency Tracts and in Ganjam the projected district board line from Berhampur to Russellkonda will give an outlet for the agency products especially turmeric which is the hillman's most valuable asset. It is probable that hereafter where communications have been improved many parts of the hills may be covered with plantation products. Coffee and oranges have already been tried with success on a small scale in various parts of the agency.

But though the country generally may benefit by the opening up of this wild tract, there are dangers that the advance of civilization, unless preventive measures are taken, may lead to the deterioration and not to the progress of the hill-tribes. As communications are improved, the danger from malaria diminished, and the fear of the tribes is curtailed by administration, the money-lender, and the drink-seller and the litigant come in. The hill-men, though many of them, notably the Savaras and some of the Khonds, are excellent cultivators, are nearly all of them thriftless and too many of them addicted to strong drink especially during the month of Chaitra when it is the duty of the hillman to spend his days in hunting and his nights in debauchery. Drink leads to debt with the sowcar, who generally combines the profession of money-lender and publican, and debt leads to the loss of land, the hillman's only capital. When he has

lost his rich paddy land in the valley he is compelled to resort to 'podu' cultivation on the hill side, burning down the forests, cultivating for a year or two, and then moving on to another patch of jungles. In Hill Madgole to give but one instance, Yendrika Hill, which twenty years ago was clothed with splendid forest, the haunt of the bison and the sambhur, is now absolutely bare. In many cases the hillman after he has lost his land, loses also his personal freedom and is compelled to repay a hundred times over in service a loan of which he probably only obtained a mere fraction originally. Efforts have been made to put a stop to these malpractices by a special Act (Act I of 1917) in accordance with which no transfer of land from a hillman to an outsider will be recognized unless it is approved by a Government official of standing. The rate of interest has been limited and measures have been taken to prevent the Courts in the plains from dispossessing the hillman of his lands by a decree in his absence. In some parts of the Agency the lands of the outsiders are to be roughly surveyed and registered, so that hereafter no outsider can claim any other land without producing a Government official's approval of the transfer. Khond land in Chokkapad, Goomsur and the Mohiri hills was assessed at a specially light assessment in the resettlement on condition of non-alienation. Special loan rules to enable the hillman to take advances from Government on the joint security of the villagers and repay them, as he prefers to do, in kind, are being framed, and co-operative societies are being started to enable them to bank their savings and to obtain cheap loans and in two cases, to enable the hillman to dispose of his produce without being cheated. A Special Officer has been appointed to deal with co-operation in the Ganjam Agency. Among a people so honest (though at present so thriftless) as the hillmen co-operation if well supervised and if collections are made in kind at the right season should have a very

bright future. Special rules have been made to regulate or to prohibit the reduction of these tribes by emigration agents playing upon their credulity. Efforts are also being made to restrict the drink evil by largely reducing the number of arrack shops, and thus removing temptation from the doors of the hillmen. As for education there is a larger number of schools under the management of the Government and local boards especially in the Godavari Agency. There were on 31st March 1919, to quote the latest Education report, 289 schools in the three agencies chiefly intended for hill tribes, attended by 9,813 pupils of whom 4,550 belonged to the aboriginal classes. The total number of aboriginal pupils in all classes of schools in the agencies was 6,127. Scholarships have also been awarded chiefly among the Koyas, Khonds, Savaras, Gadabas, Jatapus, and Porojas, to induce them to attend school. There are Government sessional schools for the Khonds and Savaras and some training has been given to hill tribes in a training class in the Bhadrachalam secondary school. A problem which still has to be tackled in connexion with these and most of the other hill tribes of the Presidency is that of venereal disease which is rendered virulent here and elsewhere by the promiscuous habits of the hillmen before marriage, though after marriage they are generally faithful.

Private effort in these agencies has been practically confined to Christian Missionary bodies. The Rev. J. Cain and Mrs. Cain of the Church Missionary Society have for many years done admirable work among the Koyas, teaching them lace making and other industries, curing them in their sickness, and generally endeavouring to bring them to a civilized mode of life. The German Lutheran Mission worked for some years among the hill tribes of Vizagapatam, chiefly among the Dombs. And the American Baptist Mission in the Ganjam hills has established schools largely attended by the Panos and

by some of the Khonds; in addition to literary education some of the Pano children are being trained in weaving.

The next most important area is *The Nilgiris* where the chief tribes are the Badagas, the Kotas, and the Todas who are found almost entirely on these hills, and the Irulars, Paniyans and Kurumbas most of whom live outside the district. The Badagas have a doubtful claim to be classed as an aboriginal or hill tribe, as traditionally they are immigrants from the plains and still speak a dialect of Kanarese. They are, moreover, much more civilized than most of the tribes included under this category. They follow all sorts of trades, though chiefly agriculturists, they have large and prosperous villages with tiled houses, and generally are much higher in standing than most of the hill tribes. The greater part of them are Lingayats. The Kotas, an aboriginal tribe, are carrion eaters and therefore untouchable. The Todas, though extremely small in numbers and actually diminishing, are important from an anthropological point of view. Drink, venereal disease and debt are their chief dangers. The Kurumbas and Irulas are the shyest of the tribes on these hills and come less in contact with civilized life.

The most important Government effort to uplift the tribes on these hills has been in the way of founding co-operative societies, of which there are as many as 46, including trading societies for the disposal of their produce. There is a co-operative union with a Badaga supervisor which shows promising signs of success. A number of liquor shops have been suppressed. Agriculture has been encouraged, especially potato cultivation. Special grazing and fuel rights have been given to the hillmen and lands have been granted to them with conditions as to alienation. The District Board has opened special schools for the more backward of these classes and scholarships are also granted and books and slates given free. The C.E.Z.M. Society maintains an orphanage

for the Todas at Octacamund, special schools at convenient centres and a Toda industrial colony. The Missionary bodies have opened schools for the Kotas, Irulars and Kurumbas.

The Chenchus whose head-quarters are in the *Nallamalai hills* of Kurnool present peculiar difficulties. The Nallamalais contain the largest compact area of reserved forest in India and under the original settlement of these hills the Chenchus are allowed privileges in regard to minor forest produce, grazing, hunting and other rights. They burn the young grass as other graziers do, they burn in order to collect minor produce more readily, they burn to be able to track their game, and they burn for wanton mischief. They are supposed to be the hereditary guards of Srisailam temple, and levy a tax on the pilgrims who go there through the jungle, a fee nominally for protection from themselves. They claim fees for watching the crops in villages near their gudems or settlements, a fee which is little better than blackmail. They carry bows and arrows, which they shoot at the slightest provocation, and are so elusive that it is almost impossible to catch them in the tall grass of their jungles. Though their rights are confined to the collection of minor forest produce, they have no scruples in cutting down the tallest of trees and would not hesitate to shoot down a forest subordinate who dared to restrict them in doing so. The Abkari authorities are not expected to try to prevent their distillation in the jungle for their own use and it is more than they can do to prevent them from disposing of their illicit liquor in the villages outside.

For many years Government have been endeavouring to reform these people chiefly through the Forest Department who have raised many acres of teak and other plantations at Government cost chiefly in order to give them settled employment. Lately a Special Officer of experience with criminal tribes has been endeavouring to civilize them

by teaching them agriculture, by giving them work in splitting bamboos, by opening special shops to enable them to buy grain, by giving them work to do in the special forest coupes when no other work is available, and by looking after them when they are sick (they also are terribly affected with venereal disease). He has gained their confidence in an extraordinary manner, and his labours should ultimately bear excellent fruit, but the place is extremely malarious so that he has been compelled to take leave, and his work has been continually hampered by the irreconcilables who lead the young men astray into dacoity and other crimes, and generally undo in a day what has taken him months to instil.' He has also been extremely 'unfortunate' in being faced with two bad seasons out of three in which he has been working. His hands are now to be strengthened to deal with the offenders; and it is hoped that the Chenchu problem may be solved before the forests are completely destroyed. The forest department on their part are making plans which will give them sufficient work to enable them to earn an honest livelihood, if they will.

The Malayalis of the hills of North Arcot, Salem, Trichinopoly and Coimbatore though not aboriginals may claim to be called a hill tribe by right of long continued residence, of backwardness in point of civilization. The Government have endeavoured to prevent them from losing their lands by making special restrictions on alienations to outsiders and have given them special concessions in regard to obtaining lands on favourable terms of assessment. The planters give them an opportunity of earning honest wages and the forest department are giving them employment as subordinates and thus interesting them in the conservation of the forests. A co-operative society has recently been started on the Kollemalais by a missionary, Mr. Brand, who has also opened a dispensary for them. There are five schools for the Malayalis with over one hundred pupils.

On the *Coimbatore* hills of the western ghats, the Sholagars, Kurumbas, Irulars, Malasars, Mudugars, Pulaiyars and Kadars have been taken special care of by the Forest officers, who have allotted them lands free of assessment, employ them as guards, fire patrols, mahouts and in other occupations, have started a special school for them, allow them to collect certain forest produce free of charge and pay them for it on collection, and generally enable them to obtain an honest settled living. No figures are available as to the alienation of their lands or their indebtedness to the money-lenders and these questions demand further inquiry.

In the *Malabar Hills* Mr. Gray in his investigation of 1917 found the following aboriginal and hill tribes:—

Pulayan, Paniyan, Kurichiyan Kurumba, Karimbalan, Malakkar (Malapanikkar), Malayan, Malasar Nayakkan (Kattu Nayan) Kadar, Mavilon, Vettuvan, Arunadan, Alan, Adiyen, Pathiyan and Uridavan.

None of these are sufficiently large in numbers to be separately enumerated in the list of castes in the Gazetteer of the district. The figures for the Presidency are given in the table above except in the case of Malakkar, Malayan, Alan, Adiyen, Pathiyan and Uridavan which were not apparently considered worthy of separate record in the Madras Census report. No special effort seems to have been made to uplift these people in the past. Most of them live by petty agriculture or by hunting. Further inquiry will be made by the Commissioner of Labour to see whether any action is necessary. The Kudiya which the Collector refers to as the only hill-tribe in South Kanara numbered only 4,000 in all and as it is reported that a number of them are not hillmen but live on the plains, the tribe must be an extremely small one.

In the extreme south of the Presidency on the hills of *Madura, Ramnad and Tinnevely* the Palaiyars, Pulaiyars and the Kanis are the only hill tribes, of which Palaiyars

are much the wildest and shyest tribes in those parts. Kanis have been taught agriculture through the American Madura Mission, church Mission Society have done something towards educating and civilising the Palaiyars. The efforts to induce these Palaiyars to settle and cultivate lands in Ramnad were frustrated by the depredations of elephants.

The Lambadis found chiefly in the Telugu districts are gipsy carriers of salt and grain; they are a primitive people and as such should be given every privilege which is granted to the depressed classes, especially in the way of education and co-operation. Owing to their traditional occupation having been largely taken from them by the bullock-cart and railway some of them have taken to crime as a method of subsistence. Lands have been granted to some of these criminal Lambadis in the Guntur district and the settlement is reported to be a success. Five special schools have been opened for them in the Bellary district.

Like the Lambadis some of Yerukalas have taken to crime. They are a wandering tribe. Apart from the special treatment accorded to the criminal branch of the tribe no special efforts have been made to improve their condition, but they should be accorded every privilege granted to the depressed classes.

The Yanadis are more settled in their habits than the Yerukalas. Their chief centre is in the Nellore district in the island of Sriharikota where they live, fish, catch white-ants, collect minor forest produce for sale, and cultivate the sandy lands of the island. The assessment on the lands is exceedingly low. They are rightly noted as a backward class for purposes of education, and special efforts have been made to improve the water-supply to guard against elephantiasis and other diseases of the places and a travelling dispensary has been established in these parts for some time to deal

with malaria. They, like the two previous tribes, need no special protection but should be open to all privileges which are to be granted to others.

Criminal tribes.—The difficulty of giving an enumeration of the criminal tribes in the Presidency is quite as great as with the aboriginals. It is rare to find a whole caste or tribe which has thieving as its chief profession and it would be unjust as well as incorrect to stigmatise the whole tribe as criminal for the sake of an erring section of its members. Thus without doubt some of the Kallars (as their name implies) are hereditary thieves but large sections of them are as respectable as their neighbours. Even in the same district, as Madura, the Kallars of Melur as a body have forsworn theft in a registered document and as a body have fairly kept this oath, whereas their fellow caste men south of the Vaigai refuse to restrain their propensity to thieve. The Valaiyans as a caste are respectable hunters, catchers of rates and of white-ants which they sell for food, but some sections of them in Coimbatore are addicted to crime. The Parayans are generally a most honest set of depressed people, but the Veppur Parayans and Vaniyan Parayans have taken largely to crime. So with Boyas or Bedars of the Ceded Districts who formed the backbone of some of Tippu's armies, it would be a grave error to call the Boyas as a whole criminal tribes, because of the evil habits of the Boyas of Kurnool. Not all the Dommaras, those excellent acrobats, are thieves. The Konda Doras include several hill chieftains who would rightly be insulted if any slur were cast upon the tribe as a whole. The Padayachis are, as a general class, excellent farm labourers. The Jogis are beggars and pig-breeders as a caste; some of them are employed as cultivators, destroyers of pariah dogs and scavengers; it is a comparatively small section who go in for robbery and dacoity.

The following table, therefore, which shows the different tribes registered under the Criminal Tribes Act, must not be understood to suggest that the total number of the castes and the tribes mentioned are addicted to crime :—

Name of criminal tribes	Districts
Donga Yerukālas	Godavari, Nellore, Guntur, Kistna, Kurnool, Bellary and Cuddapah.
Vayalpad or Nawabpeta Korachas ...	Chittoor, Anantapur, Salem, Cuddapah, and Nellore.
Donga Dasaris	Nellore, Kurnool, Guntur, Kistna and Godavari.
Veppur Paraiyas	South Arcot.
Donga Woddars	Kurnool, Anantapur, Cuddappa, Nellore, Guntur and Kistna.
Togamalai Koravas or Kepmaris ...	Trichinopoly, South Arcot, Chingleput, North Arcot, Cuddapah and Salem.
Rudrapad Korachas	Bellary.
Dommaras	Nellore.
Salem-Melurnad Koravas	Salem, Coimbatore, Trichinopoly and North Arcot.
Attur-Kilnad Koravas	Salem, South Arcot and Trichinopoly.
Nakkalas	Godavari.
Gandharvakottai Koravas	Tanjore.
Vanganur Paraiyas	North Arcot, Chittoor, Chingleput and Nellore.
Jogis	North Arcot, Chingleput, Chittoor, South Arcot and Nellore,
Gang of hired assassins of 28 persons frequenting	Cuddapha, Kurnool and Anantapur.
Kilagudi Kallas	Madura.
Kondadoras	Vizagapatam.
Vellayankuppam Padayachis	South Arcot.
Kuttapal Kallas	Trichinopoly and Tanjore.
Chettinad Valayas	Ramnad.
Rellis	Vizagapatam.
Sorikkampatti Kallas	Madura.
Mela Urappanur Kallas	Do.
Pusalapuram Kallas	Do.
Uppa Koravas of Koilpattu and Anavaradanallur	Tinnevelly.
Vaduvarpatti Koravas	Ramanad, Madura and Tinnevelly.
Paidis	Vizagapatam.
Sakkaraitamadai Koravas	South Arcot and North Arcot.

Name criminal tribes				Districts
Telaga Pamulas	...	...	...	Ganjam, Vizagapatam, Godavari, Kistna, Guntur. Nellore, Kurnool and Cuddaah.
Donga Dasaris	...	...	...	Bellary, Cuddapah, Chittoor and Anantapur.
Urali Goundans of Dhulipatti	...	...	...	Trichinopoly.
A section of Koravas in Koilpatti taluk	...	...	...	Tinnevelly.
Nattam Korachas	...	...	...	Chittoor.
Boyas	...	...	...	Kurnool.
Piramalai Kallas	...	...	..	Madura.
Karavas a section in Hosur taluk	...	...	...	Salem.
Maravars of Poolam in the Nanguneri taluk	...	...	...	Tinnevelly.
Twenty-one sections of Valayas	...	...	...	Coimbatore.
A gang of Anippai Malas and a Chetti	...	...	...	Godavari.
Oriya Dombs in Jeypore	...	...	...	Vizagapatam.

The assassins of Cuddapah are not a tribe at all, even that dangerous tribe the Donga Dasaris of Bellary recruit their members from outside. On the other hand it is to be feared that this list cannot be said to be exhaustive of the castes, tribes, or sections of them addicted to crime. It does not include the Chenchus already mentioned, the Tottiyar Naicks (the criminal members of whom form very dangerous gangs) the Ghasis, horse-keepers many of them but many also hereditary criminals, the Lambadis some of whom have already been noted to have turned criminal, and the Kalingas (only a small section of the caste) whose depredations are not confined to the Presidency.

The principal steps which Government have taken up to now for the reformation and uplift of the criminal tribes have been the granting of land to them and the establishment of criminal settlements. Special rules have been in force in the Madura district for some years giving a preferential right to the Kallars who are willing to take up land and thus secure economic freedom and make themselves independent of the necessity of earning their living by crime. In Guntur

a large area has been set apart for certain criminal Lambadis. Among the Kallars owing to the special efforts made by M.R.Ry. A. Vedachalla Ayyar Avargal (now acting Registrar of Co-operative Societies) a large number of societies were started to teach them the virtues of thrift; unfortunately after he left, the interest shown in the societies dwindled to some extent and some of the societies fell into arrears, but with the high price of cotton, the chief staple of the tract, it should now be possible to re-establish them on a sound basis. Reference has already been made to the work done by the Chenchus under the heading of aboriginals. An attempt to start a basket trunk making factory with a boarding school started for the Koravars in Ramnad has been recently made by the Rev. Mr. Jefferis with the assistance of Mr. Loveluck, District Superintendent of Police. Under education the criminal tribes have all the privileges of backward classes, but as there is generally speaking no caste objection to their admission into the ordinary schools, no special schools have been set apart for them except in the criminal settlements.

It is in these settlements that the chief attempt at reforming the tribes has been made, The location, of inmate's number and the agencies which are attempting the reformation are given in the following table:—

Name of settlement	Number of inmates	Agency
Sitanagaram Settlement, Guntur district ...	720	The Salvation Army,
Stuartpuram do do ...	1,524	do.
Bhumannagadda Settlement, Chittoor district ...	476	do.
Kavali, Allur and Bitragunta Settlements, Nellore district	1,860	The American Baptist Mission.
Aziznagar Settlement, South Arcot district ...	995	Government.
Reformatory Settlement, Guntur district ...	158	The Salvation Army,
Reformatory Settlement, Perambur Barracks, Madras	219	do.
Pallavaram Industrial settlement, Chingalput district	178	do.
Kulasekharapatnam Settlement, Tinnevely district.	176	East India Distilleries and Sugar Factories, Limited.
Sidhapuram Settlement, Kurnool disirict ...	207	Government.
Kalla Settlement, Gudalur, Madura district.	26	Madura American Mission.

It will be seen that by far the greater part of the work is undertaken by missionary bodies, and Government are of opinion that as far as possible there should be some religious or philanthropic agency attached to each settlement. Of the mission settlements, all but two are in charge of the Salavation Army which has a special organization for this work and has made it a part of its duties to attempt the reclamation of the criminal all over the world. The members are inspired with zeal and enthusiasm as well as experience, all of which qualities are most necessary for this most difficult and sometimes dangerous work. The Army has the great additional advantage that owing to the great size of the organization they are able to provide a substitute for any of the managers who should fall ill or have to take leave for other reasons or be found unsuitable for the particular post he holds. Up till now, these great advantages have been

to some extent neutralized by other drawbacks. The great distance of Simla, the Army Head-quarters in India, from this Presidency, has entailed some difficulties in the co-ordination of the work with Government and with individual managers, and the fact that managers themselves are liable to be transferred all over India has made the acquisition of the Vernacular an impedient to the influence of some of the best of their workers. Hereafter the Army in India is to be divided and there is to be a Special Commissioner for Southern India and Ceylon, so that both of these difficulties should shortly disappear. Two other missionary societies and one business firm are giving their services to this work.

The object of a criminal settlement is the reformation of the inmates by inducing them to lead a settled life, to give them an opportunity of earning a regular income apart from crime, to break them of their idle,

vicious and restless habits by regular discipline, by removing the temptation to crime and to drink and by holding out hopes of an independent life as farmer or artificer when they have shown by their continued good work that they are worthy of freedom. As a general rule when members of a tribe are admitted to a settlement, they are lazy and inefficient and unable to undertake any but the simpler forms of manual labour and often unwilling to undertake that. By tact and pressure they are taught to work regularly at quarrying as at Sitanagaram or at Pallavaram, at reclamation of land or at earth-work, as in Kavali, Stuartpuram, Aziznagar or Bhumannagadda. As they show themselves worthy of confidence or capable of better things, the settlers are taught a regular industry such as leather-making in Pallavaram or rope-making at Bhumannagadda, and weaving both cotton and silk in most of the settlements or are given land to cultivate with no rights of alienation but with the hope of making the land their own ultimately and settling down as regular farmers. The most reliable of the settlers are given work as maistris or as settlement police; it is the policy of the Government to exclude as far as possible the police from the settlements as they are a continual reminder of the old criminal life of the tribe. These official positions are much coveted by the settlers and give them a standing and a responsibility of their own which has an excellent reforming effect. The Government have also under consideration the question of forming a new penal settlement for the most refractory of the tribes, as the efforts of the settlement managers are in many cases set at naught by a few determined criminals, who are unamenable to discipline themselves and are constantly interfering with the smooth working of the settlement and leading the other members, especially the younger members, astray.

Medical relief is generally given to the settlers by periodical visits from the nearest

Government Medical officer. In Sitanagaram the Salvation Army has provided a medical officer of their own and in Stuartpuram a dispensary building has been built and should shortly be occupied by a medical officer. In addition to this, practically all the managers and their wives have some knowledge of the rudiments of medicine, and their care and attention to the sick is one of the most striking and promising features of the settlement work. Gratitude is no mean motive for reform.

The most important factor of all in settlement work is the education of the children. It is a matter which has been much debated whether it is not better in the interests of the children to remove them entirely from their surroundings and to give them a new start in life where they will be absolutely untainted by a criminal environment. But against this must be set the fact that the removal of the children from a settlement removes one of the chief ties which bind the settler to his house and to a more steady way of life. The best compromise between these two conflicting views is that adopted by the Rev. S. D. Bawden at Kavali, where there is a boarding school in the settlement in which the children live and are educated, but the parents are allowed to see them under supervision and are not entirely separated from them. This method will probably shortly be extended to Bhumannagadda, Sitanagaram and Stuartpuram, where there is already an embryo boarding school. Meanwhile in all the settlements schools have been established. At first considerable opposition was encountered from many of the settlers especially against the education of the girls: but this has now been almost entirely changed and the happy eager faces of the children are one of most delightful features of a visit to a criminal settlement. As they grow up they are taught leather work, weaving, rope-making or agriculture to fit them to take their places ultimately as respectable members of society.

The following table shows the number attending school in each settlement :—

Settlement	Number of children receiving education
Sitanagaram	94
Stuartpuram	200
Bhumannagadda	96
Kavali, Allur and Bitragunta ...	326
Aziznagar	95
Reformatory settlement, Guntur ...	20
Do. Madras	29
Kulasekharapatnam	34
Sidhapuram	52
Kalla	3

In addition to the schools in the settlements there are two schools, one a Salvation Army Boy's school now at Bangalore but to be transferred to Perambur, when a building for it is completed and a Salvation Army Girls' school at Nellore. These two schools are to be constituted as industrial schools but, pending the construction of buildings for the purpose, are at present intended for the children whose parents have died, have absconded or are in jail. The fact that absconding means the loss of the children has a wholesale retentive effect.

Mistakes may have been made in the past and great difficulties been encountered at the beginning of this work, but the general lines on which the settlement of these tribes should proceed, have now been laid down and if work be continued on these lines there can be little doubt that there will be a wonderful difference in the next generation of the tribes and that a great reforming work will have been carried out. Already the smiling gardens of Stuartpuram, with rubber, mangoes, casuarinas, tomatoes, and potatoes growing on what was a waste of sand shows what can be done by a man of energy and capacity like Mr. Robilliard of the Salvation Army. In Kavali the most deserving of the settlers have been given practical freedom on their own lands and in their own houses at Allur.

The Veppur Faraiyans of Pallavaram turned out wonderful boot-soles for the soldiers during the war and are now providing the police whom they used so much to dread with the foot-gear that will enable them to pursue the criminal into his thorny fastnesses. The next generation will have a fair chance to forget that they are criminals by birth and by tradition.

Untouchables.—As observed by the Board of Revenue in their Proceedings No. 60, dated 18th March 1918, which should be read by all those interested in the subject, the question of the amelioration of the untouchables is a much larger problem than that of either aboriginal or criminal tribes. They form about 17 per cent of the entire population of the Presidency and in some districts the proportion is naturally higher. The following table shows the number of untouchables for each district in the Presidency and the proportion which they bear to the total population of each district :—

District	Total population	Number of untouchables	Percentage of column (3) to column (2)
1.	2.	3.	4.
Chingleput ...	1,406,008	3,83,054	27.24
South Arcot ...	2,362,566	6,26,342	26.51
Godavari ...	1,445,957	3,57,890	24.75
Kistna ...	1,997,535	4,61,173	23.08
Tanjore ...	2,362,689	5,07,642	21.48
Nilgiris ...	1,18,618	24,504	20.65
Nellore ...	1,328,152	2,49,286	18.77
Trichinopoly ...	2,107,029	3,86,065	18.32
Tinnevelly ...	1,790,619	3,20,805	17.91
Chittoor ...	1,238,742	2,11,827	17.10
Madura ...	1,932,832	3,20,084	16.56
North Arcot ...	1,960,960	3,22,411	16.44

District	Total population	Number of untouchables	Percentage of column (3) to column (2)
1.	2.	3.	4.
Coimbatore ...	2,116,564	3,20,572	15.14
Ramnad ...	1,658,453	2,38,946	14.40
Salem ...	1,766,680	2,52,784	14.30
Anantapur ...	9,63,223	1,28,153	13.30
Cuddapah ...	8,93,998	1,15,391	12.90
Kurnool ...	9,35,199	1,18,445	12.66
Guntur ...	1,697,551	2,11,823	12.55
Bellary ...	9,69,436	1,16,944	12.06
Madras ...	5,18,660	60,835	11.73
Vizagapatam ...	2,169,670	2,16,973	10.00
South Kanara ...	1,195,227	1,11,079	9.29
Malabar ...	3,015,119	2,63,247	8.71
Ganjam ...	1,870,826	1,58,501	8.47
Total ...	39,822,313	6,484,776	..

In no less than six districts of the Presidency more than one person in every five is theoretically not allowed to come within a distance of 64 feet of the higher castes without pollution. The purificatory ceremonies are now generally neglected except by the most orthodox but in some parts especially on the West Coast, the restrictions are still very strong. Mr. Thurston, for example, gives an instance where some outcastes whom he wished to measure had to come many miles round to cross a river lest they should pollute a bridge by their presence. In the Malabar District Gazetteer published as recently as 1915, it is stated as a fact that even to this day the Nayadis who live largely by begging have to leave their cloths on the road-side and retire to some distance whence they call out to the passersby to deposit their alms upon the cloth. Slavery has been

forbidden for many years by the Penal Code but in C.A. Nos. 26 and 27 of 1917, the High Court of Madras had a case before them which they instance as an undoubted example of the sale of a slave. The public water-supply is absolutely forbidden in nearly every village to castes which number one-sixth of the people of the Presidency. Last year an English gentleman, a pronounced nationalist, while driving through a municipal town with a student was surprised at a request from his neighbour that he might be allowed to get out and walk and rejoin him later on. He was still more surprised to find when his companion returned that his reason for descending was that owing to his caste he was not allowed to pass through a particular street. Theoretically all Government offices are open to persons of every class and creed, but a rich and respectable gentleman recently returned from abroad informed the writer of this note that he was made to go outside a certain public office when it was discovered that he was of low caste. In the recent Ganjam famine, it was found necessary to provide work for the outcastes on a different part of the works from the other labourers. Even in the presence of actual famine, the rules of distance had to be obeyed.

On a respectable Panchama gentleman being appointed to a seat on a municipal council five of the members including a Mohamedan immediately sent in their resignations and were with difficulty induced to withdraw them. Though in theory all schools financed with public money are open to all classes of the community, in practice there have been great difficulties in giving effect to this policy. Many of the hamlets where these people live, especially in the delta districts, are extremely congested and insanitary. Many of them are cut off from access to the main village or the road except at the good will of the owner of the fields they must traverse. To get to their water-supply (such as it is) or to their burial or burning ground, they are often similarly at

the mercy of the land-owners. In many districts the Panchama field labourer is so tied up by debt to his master (who takes care that the debt shall not be redeemed) that he is practically in the position of a serf. The system of man-mortgage by which the labourer binds himself and frequently his heirs to service till a debt is redeemed is well-known. Mr. Gray, in his recent report on the condition of these classes in the Chingleput district, was able to reproduce documents in which the entire property of the labourer was mortgaged to the master, so that the Panchama is completely at his master's mercy. In some cases the masters, afraid that the courts may refuse to recognize the validity of these agreements for service in exchange for loans, induced the labourer to mortgage his house-site instead, or to give an acknowledgment that the house is not his own but his masters. This difficulty of house-site is specially in evidence in the 'mirasi' districts where the farmers claim that every acre of land including waste and poramboke, is their own, and the field labourer, even if by emigration to some other district or country he is enabled to acquire a competence, is still at the mercy of his master if he wishes to return to his home. It would, of course, be a mistake to suppose that the masters always use the great power they have unwisely, or that the labourer does not occasionally obtain advantages from remaining under a kind mirasidar; such as presents at festivals, assistance at the time of marriage, and especially in the way of necessary subsistence during the slack season, when little regular employment is available. Such arguments, however, would apply with equal force to any system under which the personal liberty of the servant is at the mercy of the master; and Government have decided that this system is bad and must be discouraged in every possible way. In the course of the Special Officer's inquiries in Tanjore and other districts, it has been found that in many parts the Panchama, whether labourer or small far-

mer, is continually a loser in buying the ordinary necessities of life and in disposing of his produce through his inability to enter a shop or even to pass through many of the streets where the ordinary shopkeeper lives. In many cases by actual testing it has been found that the Panchama loses a large percentage on every deal. With such disabilities and such degrading conditions of life combined too often with wages which are distinctly low, it is not surprising that the Panchama labourer frequently endeavours to forget his troubles in liquor. Nor is it to be wondered at that a large number of them, home loving though they are, seek to improve their economic and social position by migrating to countries where they can hope to rise to a higher status.

Before proceeding to discuss what has been done already and what more can be done towards the solution of the problem of the Panchama, it is necessary to guard against two possible misconstructions. In the first place, the examples quoted in the preceding paragraph of the hardships and disabilities with which the Panchama has to contend are simply put forward to show the gravity of the problem as it exists at present and not in any sense as an attack on any system of society or religion. Nor in the second place, is it intended to disparage in any way the great advances which have already been made in this presidency, perhaps more than in any other, as was admitted in the debate on the subject in the Imperial Legislative Council.

Of the methods which are open for the uplifting of the Panchamas the most obvious is education. When the Panchama has come under missionary influence and received some education, the difference in his cleanliness, self-respect and capacity for higher things is remarkable. The Panchama child is as was recently observed by the head of one of the non-Christian societies in Madras by no means a fool. On the contrary he is often very quick to learn and responds

admirably to the efforts made on his behalf. In the last quarter of a century the number of Panchama pupils in public institutions (including aided schools) has risen from thirty thousand to well over one hundred and fifty thousand, or 400 per cent. The number of public institutions in which they are being educated rose in the same period from fourteen hundred to more than five thousand. In 1892 there were only eleven primary schools for girls; there are now a hundred. Much has, therefore, been done already, but how much still remains to be done is clear from the fact that till now only 2 per cent of the total number of these people are in school, which is less than half the percentage of attendance among the remainder of the population of the Presidency. Moreover, as the following table will show, the different districts vary extremely in their rate of progress:—

District	Panchama population	Panchama boys and girls	Percentage to total Panchama population [column (3) to (2)]	Percentage of boys girls at school out of the general population.
1	2	3	4	5
Madras ..	60,835	6,281	10.3	11.8
Guntur ...	211,823	11,721	5.6	5.5
Nilgiris ...	24,504	1,014	4.1	6.1
Kistna ...	461,173	14,242	3.0	5.4
Nellore ...	249,286	7,125	2.9	3.5
Ganjam ...	159,501	4,280	2.7	3.4
Godavari ...	357,890	8,997	2.5	4.6
Chinglepet..	383,054	8,683	2.3	4.3
Tinnevelly..	326,805	7,117	2.2	5.7
North Arcot	322,411	5,431	1.7	3.7
Madura ...	320,084	5,386	1.7	3.5
Vizagapatam	216,973	3,716	1.7	2.5

Kurnool ...	118,445	1,941	1.7	4.0
Bellary ...	116,944	1,877	1.6	3.3
South Arcot.	626,342	7,522	1.4	3.4
Chittoor ...	211,827	2,936	1.4	3.1
Trichinopoly	386,065	4,929	1.3	3.4
Tanjore ...	507,642	5,989	1.2	4.8
Ramnad ..	238,946	3,788	1.2	3.9
Coimbatore.	320,572	3,911	1.2	2.9
Cuddapah...	115,391	1,306	1.1	3.5
Malabar ...	263,247	2,755	1.0	6.4
Salem ..	252,784	2,267	0.9	2.3
Anantapur...	128,153	1,019	0.8	2.9
South Kanara	111,079	541	0.5	4.5
Total ...	6,484,776	124,774	...	...

In Madras City where the general standard of education is high and there is a real movement for the elevation of the depressed classes, and the opinion of the public in the matter is being awakened, the proportion of educated persons is almost as high among Panchamas as among the general population. The same is true to a less extent of Guntur, Kistna and Nellore where the Christian population is large and missionary influence has been brought to bear. In places like Malabar and South Kanara though the general standard of education is high (Malabar is first in the Presidency outside Madras) only one per cent in Malabar and a half per cent in South Kanara among the Panchamas are reading in school. The work of the various missionary societies in giving education to the Panchamas is beyond praise. They have over 3,500 schools with nearly a hundred thousand pupils. In former years the proportion of Panchama schools under mission management was much greater; in 1892 fourteen out of every fifteen were managed by these bodies. Moreover not only were the missions pioneers in the education of the Panchama in schools of his

own, but by their resolute stand in insisting that he should be admitted to their higher educational institutions they gave him the opportunity he needed to raise, and created a body of public opinion among their other students who were ready to treat the Panchama as a fellow human being. This good work is now being assisted by a number of other than Christian societies; in Madras City schools are maintained by the Theosophical Society, the Depressed Classes Mission, the Southern India Brahmo Samaj, the poor School Society, the Social Service League, the Triplicane Sociological Brotherhood, and the Brotherhood, Royapetta. In Mangalore, the Depressed Classes Mission maintains a number of schools; in Masulipatam the Sri Vidyanivedika Deena Samrakshaka Sangham, in Chidambaram Swami Sramananda have done good work and in many other places throughout the Presidency similar work is being started. The importance of the work of these societies is not merely to be estimated by the number of pupils they teach, and the number of schools they maintain. Everywhere they have a great influence on public opinion, especially on the opinion of the University student, and he in his turn when he goes back to his village, becomes a centre of light and learning in the matter. It is the son who rules the mother and the mother rules the family. Shortly it is to be hoped that public opinion will become so strong that principal Hindu institution in Madras will open its doors to the Audhi Dravidians.

Special concessions have always been given by Government for the encouragement of Panchama education. They may be admitted in the elementary schools under public management free of charge and at half rates in the secondary schools. Increased rates of stipends in Government training schools and of stipendiary grants in aided training schools are allowed to Panchamas and a separate training school for Panchama masters is maintained at Madras.

Until the recent abolition of the capitation grants, special increased grants were given for Panchama pupils. Now that capitation grants have been abolished the inspecting officers have been directed to take the number of Panchama pupils in a school into account in arriving at the grant-in-aid. Special scholarships are being granted for Panchamas in secondary schools and this number can be increased if suitable candidates are available. And finally Government have decided that all schools under public management should be accessible to the Panchamas.

In carrying out his policy it has been ordered that where such a school is situated in a place inaccessible to these classes, steps should be taken at once to move it, and that no school building shall hereafter be constructed out of public funds unless it is certified that it is in a locality accessible to all classes. But while there can be no doubt that this policy of insisting upon the admission of Panchamas to all schools is the right one from its educative effect both upon the Panchamas and their higher caste brethren, it will also probably be necessary to create and maintain a large number of schools intended chiefly for the Panchama, field-labourers' schools which are open to all classes but which will chiefly be used by the members of the Panchama class.

At one time there was room to fear that the schools for Panchamas were not always inspected in the paracheri itself. This has been now made compulsory.

Questions which still remain for decision are the kind of training which is to be given to the young Panchama, whether a purely literary training is not a mistake and a training of a vocational character would not make the Panchama realize the value of education and be ready to allow his children to remain at school for longer periods. A special Government Committee has recently been sitting to consider the question of rural education. A special committee of the

missionary bodies is shortly to tour round India to consider such problems. Every one is awake to the importance as well as to the difficulty of this question and shortly by united efforts a solution should be found. Meanwhile special attempts are being made by the American Baptist Mission in Cocanada, by the A. E. L. M. Mission in Guntur, by the S. P. G. Mission in Kurnool, and the American Mission in Madura; one of the greatest difficulties will be the question of the training of teachers, but the combined efforts of the Agricultural and Education departments with private efforts working in healthy rivalry should be able to produce a suitable scheme.

Almost of equal importance with education is the co-operative movement, which teaches the Panchama the virtues of thrift and self-respect and gives him something to live for and to look forward to. There are now over fourteen thousand Panchama members of co-operative societies, nearly three times the number there were five years ago, and a special effort is to be made next year to advance the cause. There are 233 societies with over 25 Panchama members, and 118 purely Panchama societies. More than half the municipalities in the Presidency have organized their scavengers into co-operative societies and it is hoped that this example will shortly be followed throughout the Presidency. A very successful society has been started among the salt loaders of Madras.

Christian Missions, Social Service League, Depressed Classes Missions, Young Men Christian Association, and other similar associations are vying with each other in organizing and supervising co-operative societies for the poor people. The Christian Central Bank is financing many such societies on special terms. In Cuddapah and Anantapur in particular the London Mission has specially directed its activities to this important work. The Government have afforded the Panchama societies special

privileges in the way of supervision. As in the case of education, the balance of opinion seems to be that though the ideal to be aimed at is to absorb the Panchamas into general societies and unions and this policy of admitting Panchamas should be pressed on every possible occasion, yet for some time to come it will be necessary to organize societies composed chiefly of Panchamas, field-labourers' societies, which will require closer supervision than others and where the Panchama will not only have the privilege of being a member of the society, but have a share in its management and control.

Special efforts have been made in Tanjore by the Deputy Collector M.R. Ry. D. Arulanandam Pillai Avargal appointed to acquire house-sites for Panchamas at their expense. Over fifty societies have been organized (in 1917—98 there were only 43 Panchamas societies in the whole Presidency). More than fifty thousand rupees has been put down for the acquisition of house-sites by the Panchamas themselves who have pledged themselves to pay in instalments two lakhs and a half; experiments have been made in co-operative trading and ordinary work in co-operative credit has gone on simultaneously. In Godavari, where a Special Deputy Collector has been working for acquisition of house-sites, twenty co-operative societies have already been formed and similar work to that which has been so successful in Tanjore has been begun.

No figures are available for the work done up to the present in supplying water to the Panchamas, but much has been done by local boards and by private efforts. In particular Mr. Pandiyan has opened more than a hundred wells for these people. In Tanjore the Special Deputy Collector is trying to arrange for water-supply as well as for house-sites. Much however remains to be done and the demand of the poorer classes for water-supply should take precedence of more fastidious persons. If orders be passed that no public money should be spent on

water-supply for particular classes, till a supply open to all is assured, the pace at which these poor people are supplied would be appreciably quickened.

Land.—Government have already ordered that suitable land must be reserved for Panchamas in each district and allotted to them under special conditions. The rules for assignment of general waste lands have also been modified to enable the Panchama to obtain land. There is room to believe that not much has been done in most districts to carry out these orders, pending the more urgent necessity of providing land for soldiers, who have fought for their country (this includes probably more of the depressed classes than of any other Madras caste). Now that these lands have been selected and reserved, the work of assigning other available lands to the Panchamas will be pushed on. In particular in Chingleput district, this problem has been under the consideration of Government since 1892 when its attention was drawn to the matter by the Collector of the district (Mr. Tremenheere). Some seven hundred acres have been assigned under the orders of Government; in South Kanara under the direction of Mr. M. E. Couchman, the then Collector, a considerable number of small plots have been assigned as house-sites and backyards to landless labourers including Panchamas. In Guntur 140 acres have been assigned to the American Baptist Mission for two settlements for Christian Panchamas. In Kurnool 200 acres have been granted to the same mission for this purpose. In North Arcot and Trichinopoly 240 acres have been similarly assigned to these Roman Catholic Mission while in South Kanara 800 acres have been assigned to the Basel Mission, to the Roman Catholic Mission and the Depressed Classes Mission for the settlements of the Panchama Christians. All these settlements are granted on conditions as to alienability and to assessment which make it impossible that they should be transferred to caste people who, it

is found too often, use the Panchamas as a cloak behind which to hide their own application.

It is for this reason that the colonies under mission and other private management are so alluring. Perhaps the most successful of them is that started by the Rev. Mr. Andrew in Melrosapuram, Chingleput; a further experiment which is under consideration is the allotment of agricultural land to a co-operative society on similar terms to the allotment of house-sites acquired by the Special Deputy Collector in Tanjore. This would insure against alienation, would provide the necessary credit and thus the necessary capital and would enable the community to get rid of the lazy and inefficient members of the community who proved unfit to make farmers. Experiments are now being made on these lines in Chingleput and North Arcot districts.

Temperance.—Efforts to deal direct with the drink evil have chiefly been made by private societies, temperance societies, social service societies and others who have endeavoured by precept and by example to draw away the Panchama from his favourite vice. Co-operative societies by giving the Panchama a method of saving have had an excellent effect already in this direction especially among the scavengers of the municipalities. In Tanjore many of the societies started for the acquisition of house-sites have induced their members to give up liquor. Attempts have been made to offer counter-attractions by opening tea and coffee shops, which have not however proved a general success. Sale of food with drink, has also been abandoned as it tended to take the shape of spicy producers of thirst. The policy of Government has been to produce the maximum of revenue with the minimum of consumption; to this end the taxation on the unit of intoxicants has been very largely increased and at the same time over eleven thousand shops have been closed.

Shop sites have been removed from the road sides ; orders have been passed that all shops should be open to streets, private bars being abolished. Attempts have been made to substitute a weaker liquor. Temperance teaching has been introduced in schools. Licensees are severely punished if they sell liquor for credit or exchange for anything but cash or permit drunkenness on the premises. In order to show to the public that Government are determined to raise the status of the Panchamas as far as in them lies, appointments have been made by nomination to a number of local bodies and recently to the Provincial Legislative Council and to the Corporation of Madras.

Finally, to carry out all the schemes for the betterment of the depressed classes, a Commissioner of Labour has been appointed whose chief care it will be to see that their interests are advanced. Under his guidance it is hoped that a large staff will be maintained whose object it will be to attend to the improvement of water-supply, the advancement of education, the institution of co-operative societies, the improvement of housing conditions including the acquisition of house-sites, the provision of access to house-sites, burial grounds, water-supply and the like ; to the granting of lands, the foundation of mission or co-operative colonies and all other similar means which may suggest themselves for the amelioration of these classes.

It is announced that a remarkable bed of chalcostilite has been discovered in the valley of the Ouad Cherrat at a place called Rar el Anz, about forty miles east of Casablanca (Morocco). The crystals of the chalcostilite are stated to be remarkable both for their size and for their beauty.

ECONOMICS IN THE WEST.

Industrial Unrest.

London, 19th February, 1920.—In an economic sense the situation is steadily improving. Here as in India we still have industrial unrest but the movements are spasmodic and sectional and no longer threaten as they did a few months ago a violent upheaval calculated to do untold injury to the country's interests. We are doubtless not yet out of the wood and it may be admitted that there are still some very dangerous questions to settle, but the signs are that the worst of the industrial storm has spent itself and that we are really settling down to hard work and production—the only real cures for the diseases from which our body politic is suffering. An excellent effect has been produced by the firm attitude the Government took up in the debate on the nationalisation of the coal mines last week. The Premier's plain speaking, his emphatic statement that the Government would fight to the last with every resource of the state any attempt to override the constitution by a general strike to force nationalisation upon the country, has had its effect. There is less talk of direct action on the part of the wild men of the Labour party, and so prominent a Labour leader as Mr. Brace, the Welsh miners' representative has gone out of his way publicly to repudiate the principle and to outline a perfectly legal and inoffensive plan of campaign, the leading feature of which is the raising of a fund of a quarter million pounds to provide a Labour candidate for every constituency in the country.

The prevailing optimism as to the trade outlook is reflected in an interesting speech made in the House of Commons on Monday by the Chancellor of the Exchequer. Mr. Chamberlain was speaking on the question of a capital levy which the leader of the

Labour party (Mr. Adamson) who spoke before him, had declared to be inevitable. Arguing that this judgment was overhasty Mr. Chamberlain declared that he for one was not convinced that we would have to resort to any such expedient to meet our liabilities, great as they were. The signs of the times, he proceeded, were re-assuring. Trade was good, the export trade was reviving. The very fall in the exchange which in many ways hit us very hard as great purchasers of American produce, was in itself a great County to our export trade, and was bringing orders to our ports which otherwise would never have come here. That was the way we met our difficulties in the past. It was not by rash experiments of a dangerous kind. It was by sound known methods of finance, by encouraging the recuperative powers of the country, that we should find our salvation. He believed that these measures, wisely, courageously and presciently applied would be quite sufficient to carry us through our difficulties, and we, perhaps as well as those who looked at us from a distance would be astonished a generation hence at the ease with which we were able to carry the enormous burden of the war. There is an unmistakeable ring of confidence in these words. They but confirm the widespread impression that the worst of our difficulties are past.

INDIAN EXCHANGE.

Though the general commercial public were startled at the time by the Government announcement of their intention to replace the rupee on a gold basis at the rate of ten rupees to the sovereign, all responsible opinion applauds the decision as a wise and timely measure calculated to restore stability to the Indian exchange. There are criticisms of the step, of course, but they come mainly from sectional interests which have been prejudiced by the fixing of exchange at so comparatively low a rate. Generally speaking, the feeling is that the official policy will be to the benefit both of

India and Great Britain by stabilising conditions which have long been so erratic and uncertain as seriously to prejudice trading operations. Of the excellence of the outlook for the British manufacturer there can be no question if we apply to India Mr. Chamberlain's statement in reference to the influence of adverse exchange on British trade with America. To all intents and purposes the high rate of exchange is a bounty on the importation into India of British goods. Mr. E. M. Hughman, of Mops Pyne, Hughman and Co. of Calcutta, and hon. organizing Secretary of the Indian Society of Engineers (now the Institution of Engineers, India) has just published some interesting opinions on this subject in the *Times Trade Supplement*. As they are typical of views held in well-informed Anglo-Indian trading circles I venture to quote them:—

As a large importer of machinery, Mr. Hughman is of opinion that the British manufacturer apparently does not realize the glorious opportunity which he now has of capturing practically the whole of the trade in India and the Far East. "Various statements have been made regarding the trouble with exchange, but whatever it may mean to the rest of the world, at the present moment and for some considerable time to come it certainly means that the British manufacturer can export his goods to markets outside Europe at prices which will show the purchaser a considerable saving over dealings with certain other countries.

"If we take, for example, the question of trade with India at the present rate of exchange, one rupee purchases goods to the value of 2s. 8d. The pre-war value of the rupee was 1s. 4d., and further comment on this point is unnecessary."

There is, of course, a reverse to this picture, one with which the importer of Indian products is only too well aware. But on the whole I think the balance of advantage is with India. She gets manufactured goods which she cannot at the present time produce with advantage herself, at a low cost, and she sells her cotton, her jute, her tea and coffee and her indigo at top prices to the enrichment of her agriculturists. The cheapening of imported manufactured goods, of course, may be carried to the point at

which it will retard Indian industrial development, but we are a long way yet from that stage in the trade movement and probably there will be a reaction before the time when Indian industries are sufficiently advanced to meet anything like the whole of the domestic need of the country.

THE SUGAR TRADE.

Meanwhile, Indians will be well advised to take note of the factors in the world situation which are making for Indian development on lines which she can immediately follow with advantage. The sugar trade supplies are an excellent case in point. Not for many years, if ever, was there such a splendid opening for sugar production. There is a world shortage of the commodity which is not likely to be overtaken for many years. Present prices are abnormally high and the chances are that they will remain so for a long period. India is *par excellence* the country for sugar cultivation. In the valley of the Ganges and in many other parts of the continent are vast tracts peculiarly suitable for the cultivation of the cane. Yet India has been so neglectful of her opportunities in the past that she does not to-day produce all the sugar that she needs. How enormously her production may be improved even on its present basis of cultivation is shown in an illuminating article contributed by Professor P. Carmody, F.I.C., late Director of Agriculture, Trinidad, to the *Times Trade Supplement*. Mr. Carmody describes at some length the history of the pioneer sugar factory in Antigua, British West Indies, and demonstrates that the system of Co-operative working there introduced has been an enormous success yielding a very high return on the money invested and increasing considerably the output of sugar per ton of canes crushed. The point which the writer emphasises is that the good results attained at Antigua are due to improved methods of manufacture rather than to any appreciable extension of the area under cultivation. "In Antigua, as in other

places, under the old processes 15 tons of cane produced only one ton of sugar; in the new factory ten tons at first, and less than nine tons since the addition of the fourteen-roller mill, produce one ton of high-grade sugar. During the 15 years 100,000 tons of sugar have been produced from 928,000 tons of canes, which under the old process would have produced only 62,000 tons of sugar—a clear gain of 38,000 tons of sugar, worth £431,000, and of this sum more than half has been returned to the cane growers." Mr. Carmody calculates that if the Antiguan system is applied to India there should be a possibility of increasing the present production of 2,600,000 tons to over 4,000,000 tons. His final judgment is that "no other part of the Empire possesses greater possibilities for relieving by a substantial amount and within a reasonable time the shortage in the world's supply of sugar." It is probable that Mr. Carmody's estimate of what is possible is exaggerated as India in recent years has made great strides in the matter of scientific sugar production. At the same time there is much in his paper which should commend it to the serious consideration of those who are prominently concerned in stimulating Indian Industrial development.

PROGRESS OF HOME TRADE.

Reverting to the subject of the progress of home trade I may state that those who have lately been in the manufacturing districts are greatly impressed with the tremendous energy which is being exerted in many directions to supply demands for goods which are pouring in from all parts of the world. Nor is it a question merely of executing orders for staple goods or for goods which have always been produced here. Since the war many new lines of manufacture have been entered upon with excellent results to the enterprising capitalist. I heard the other day of a case in which a young engineer officer just demobilised backed by a Jewish capitalist set up a manufactory of aluminium goods. He knew nothing of this

branch of industry before but he applied his scientific knowledge to the work with such good effect that he is now the director of a thriving concern producing a multiplicity of goods which have a ready sale. He is sending out travellers to South America and the East and there is every prospect that what originally was a very small concern will some day not very distant be a business employing thousands of men. Here is an example which the enterprising young Indian of scientific training might profitably copy. Aluminium goods are peculiarly adapted to Indian conditions and there should be an immense sale in the bazaars to those who cannot afford the more costly copper utensils which are traditionally favoured. It is in exploiting new ventures of this character that personal success is most effectively secured and it is also in this direction that India's industrial prosperity will be attained.

There has been quite an epidemic of burglaries here in the past few months due to the general unsettlement of the times and the release from the army of a number of bad characters who found temporary respite from professional thieving in military duty. The circumstance appears to have suggested to manufacturers of safes the desirability of putting upon the market some production which should be more burglar proof than the ordinary class of safe hitherto manufactured. A Birmingham house which specialises in this line has just turned out a safe which it is thought will prove too hard a nut to crack to even the most skilful cracksman. In the traditional safe the main reliance is placed upon the locking mechanism. Experience, however, has shown that there are no locks which cannot be picked or at all events forced. In the up-to-date safe mentioned a second line of defence is organized. This consists of the placing round the inside of the door of a series of bolts which are automatically engaged when the safe is shut and which can only be disengaged by ope-

rating the lock. If the lock is destroyed the opening of the safe is a difficult business even to the man who has designed the locking mechanism, to others it is an impossible feat. Truly the resources of civilization are not exhausted. It has to be seen, however, whether the last word has really been said in this contest with the powers of darkness.

British dyes have established themselves on a firm footing, thanks to the opportunity which the war afforded. But that the system that has been set up with the aid of Government capital is still far from complete and satisfactory is revealed in a statement which has just been circulated on the authority of the Manchester Chamber of Commerce. The Chamber takes exception to the present Government policy of subsidising the dye industry without any effective guarantees as to the class of dyes produced on the ground that it has the effect of stereotyping the industry on lines which are disadvantageous to the users of dyes. It is complained that the dye industry as established concentrates on special classes of dyes which are readily produced to the exclusion of finer tone's which are not so marketable. So much is this the case that it is asserted that there are thousands of dyes made in Germany which are not produced at all in this country. The Manchester Chamber of Commerce outline certain safeguards which they propose to overcome this deficiency. They suggest that as a native dye industry is essential for the purposes of national defence the Government should specify the amount of plant which is essential to secure safety and should bear a share of the cost of keeping that plant in commission. Apart from this they consider that there should be no State support given to the industry and that there should be perfect freedom accorded to the colour users to secure essential dyes from abroad. The views set out in the Chamber's pronouncement are in strict harmony with the traditional free trade principles of Lancashire, but whether they will find acceptance in the rest of the country is a moot point. It certainly seems rather early days to talk of scrapping the machinery for the protection of this most important big industry which was set up with deliberate intention never again to be dependent on German or foreign sources for indispensable dyes.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

America Serving the World with Automobiles.

Washington, D. C., U. S. A., January 20th, 1920.—The recent assertion that three-fourths of the automobiles of the world are owned in the United States, and that nine-tenths of those now in the whole world were produced in American manufacturing establishments, lends interest to a compilation just available showing our exportation of automobiles from the earliest date to the present moment.

These figures show that the exports of automobiles and parts, including tires and engines, have in the past twenty years totalled about \$1,000,000,000. The year 1919 has far surpassed all records.

The value of automobiles and parts exported in 1919 aggregated approximately \$185,000,000 as against \$140,000,000 in 1916, the former high record; \$38,000,000 in 1914, all of which immediately preceded the war; \$11,000,000 in 1910; \$2,500,000 in 1905; and \$1,000,000 in 1902.

Of the \$185,000,000 worth of automobiles and parts exported in 1919, \$35,000,000 were commercial cars, \$75,000,000 passenger, \$41,000,000 parts of automobiles, \$30,000,000 tires, and about \$5,000,000 worth of engines.

France, formerly a large manufacturer of automobiles, is showing a remarkable appreciation of the American commercial machine, the total number of these sent to that country in 1919 having been 3,600, valued at over \$15,000,000. Great Britain, which took large numbers of American commercial machines during the war period, is now apparently manufacturing them for herself, for the total value of American-made commercial machines sent to that country has fallen from \$20,000,000 in 1917, and nearly

\$7,000,000 in 1918, to only about \$500,000 in 1919.

Sixty countries and colonies took American commercial machines in 1918, and the number of countries taking passenger machines was eighty. Iceland, in 1918, imported forty American passenger machines at a value of \$35,000,000, and one commercial machine worth \$2,400.

The imports of automobiles into the United States, which have aggregated \$31,000,000 since the first record in 1906, have declined from the high water mark of \$3,838,000 in 1910 to \$524,709 in 1919.

THE ROMANCE OF COTTON.

Cotton is the fabric of civilization. It has built up peoples, and it has riven them apart. It has brought to the world vast and permanent wealth. It has enlisted the vision of statesmen, the genius of inventors, the courage of pioneers, the forcefulness of manufacturers, the initiative of merchants and shipbuilders, and the patient toil of many millions.

An extensive library could be written on the economic aspects of cotton alone. It could be told in detail how and why the domination of its field of manufacture passed to Spain, to Holland, and finally to England, which country now shares it chiefly with the United States. The interdependence of nations which it has brought about has been the subject of numerous books and articles.

Nor is the history of the inventions which have made possible today's great production of cotton fabrics less impressive. From the unnamed Hindu genius of pre-Alexandrian days, through Arkwright and Eli Whitney, down to Jacquard and Northrop, the tale of cotton manufacture is a series of romances and tragedies, any one of which would be a story well worth telling in detail. Yet here is a work that is by no means finished. Great inventors who will apply their genius to the improvement of cotton growing and manufacture are still to be born.

The writer's present purpose, however, is to explain a few phases of the growth of the cotton industry of the United States, in its more important branches, and to indicate its position in relation to the cotton industries of the remainder of the world.

For the present and for the future, as far as that may be seen, the United States will have to continue to supply the greater part of the world's raw cotton. Staples of unusual length and strength have been grown in some foreign countries, and short and inferior fibres have come from still others. But the cotton belt of the southern United States, producing millions of bales, is the chief source of supply for all the world.

The following table gives the comparative production of the great cotton-growing areas for the 1914-1915 seasons;—

United States	...	16,500,000 bales
India	...	5,000,000 bales
Egypt	...	1,300,000 bales
Russia	...	1,300,000 bales
China	...	4,000,000 bales
Other countries	...	1,300,000 bales
Total	...	29,400,000 bales (500 lbs, each),

The American crop is thus approximately 56 per cent of the world's total. The other producing countries have shown since the beginning of the century an interesting, if not a remarkable, growth, that of China being the largest in quantity and that of Russia the largest in proportion. The American increase has been larger, absolutely, than that of any other region, and there is little indication that it will not continue to hold first position.

In the manufacture of cotton Great Britain's supremacy, while not so great proportionately as that of America in growing it, is for the present not likely to be challenged. The following table of the number of spindles in the chief manufacturing countries is based on English figures compiled shortly before the outbreak of the world war. The

number of spindles is the usual basis upon which the size of the industry is judged. It is not a perfect method, but it has fewer objections than any other:

Great Britain	...	55,576,108
United States	...	30,579,000
Germany	...	10,920,426
Russia	...	8,950,000
France	...	7,400,000
India	...	6,400,000
Austria	...	4,864,453
Italy	...	4,580,000
Latin America	...	3,100,000
Japan	...	2,250,000
Spain	...	2,200,000
Belgium	...	1,468,838
Switzerland	...	1,398,062
Scattering	...	2,499,421

Total spindles, ... 142,186,308

Such figures can only be approximate. The war has brought growth in the United States and Japan, but has certainly reduced the number of spindles in Germany, Austria and Russia. It is very doubtful, moreover, how well the French industry has been able to maintain itself. But the tabulation is accurate enough to show the relative standing of the various countries. There are, as has been indicated, other standards than the number of spindles. The United States, through the fact that it specializes, generally speaking, on the coarser fabrics, uses about 5,000,000 bales of cotton annually, as compared with Great Britain's 4,000,000. The British product, however, sells for much more. Thus the value of the spindle standard is affirmed. England, then, produces well in excess of one-third of the cotton cloth of the world, the United States considerably more than one-fifth of it, with the other countries trailing considerably behind, but prospering nevertheless.

NEW USE FOR JACK SCREWS.

After the immense new "intake crib" at Chicago, Illinois, had been completed it was found that the stone superstructure was over eighteen inches out of plumb. This was a

bad situation. The ring-shaped superstructure, built of large, square-hewn blocks of granite, has an outside diameter of seventy feet at the top and ninety feet at the bottom, with an inner diameter of forty feet.

The superstructure rests upon a double-walled steel caisson filled with concrete, which was sunk to the bottom of Lake Michigan to form the foundation of the crib. The uneven density of the clay bottom caused the caisson with its superstructure—which alone weighs about 1,500 tons—to lean over.

In order to bring both the superstructure and its foundation back to a vertical position was not feasible because the foundation did not rest upon bed rock. It was decided, however, to tilt the superstructure to a vertical position. This was done, not by rebuilding the ring of stone masonry, but by blasting away the layer of concrete by which the superstructure was joined to the foundation, placing a large number of jack screws between the foundation and the ring of masonry, and by means of these raising the superstructure on the overhanging side and lowering it on the opposite side until the whole structure was again in plumb.

The concrete was blasted out by small charges of dynamite handled so skilfully that the masonry above was not hurt in the slightest degree.

To keep the waves from dashing in where the concrete had been removed, plant shutters, suspended by ropes, were placed over the open spaces. For leveling the superstructure over 300 jacks were used, which were manned by twelve experienced house movers. Masonry underpinning was substituted for the jacks when the superstructure has been tilted to a vertical position.

HOW FAST WILL SOUND TRAVEL ?

The speed with which sound travels through space depends in some measure on the temperature of the medium through

which the sound waves pass. But what is the exact relation ?

A professor in the University of Illinois has just given the results of his investigations into this interesting subject. The experiments were conducted with an ingeniously arranged apparatus including a Helmholtz siren driven by a small electric motor. The pitch of the sound produced by the siren is indicated by a counter connected with the siren.

A spool-shaped apparatus supported by a stand is the resonator, and is of the type invented by Rayleigh. It consists of two concentric metal tubes of different diameter. A small cylinder which is placed inside the larger is encircled by a heating coil. By sending an electric current through the resistance coil the inner tube may be heated to a high temperature, and the temperature may be maintained indefinitely.

Now, the pitch of the inner tube at normal temperature is known. From the inner tube, at a point two-thirds of the distance from the open end, a vertical tube of small diameter extends upwards through the outer tube. Within that vertical tube a fine thread is suspended to which two small circular disks are attached—one just within the horizontal tube, at the end of the thread, and the other higher up, outside of the larger tube.

It is found that the lower disk will respond by rotating to siren sounds having approximately the same pitch as the resonator, while the higher disk will show a maximum deflection when the pitch of the siren is sufficiently raised to correspond with the pitch of the resonator at the higher temperature.

By plotting the observations made at different temperatures on the chart, lines were obtained which established a fixed ratio between the square of the pitch and the absolute temperature. This ratio was maintained only for temperatures up to 400

degrees Celsius. In the experiments the temperature of the inner tube was regulated by a thermostat.

THE NERVE CENTER OF THE AIRPLANE.

Now that airplanes are coming rapidly into commercial use it is well to become as familiar as possible with the general principles of their operation. What must the pilot know about his airplane during flight? He must know the direction and velocity of the wind, the altitude, direction and speed of his flight, the position relatively to the horizon of the airplane in space, the cylinder pressure and performance of the engine or engines, the quantity of fuel in the tank, and the temperature of the cooling water.

The pilot must ascertain at a glance what is necessary for him to know, and instantly control the engine, ailerons and rudder. Since he is strapped to his seat means of obtaining this information and controlling the airplane must be centralized within reach of his eyes, hands and feet.

In all modern airplanes the various instruments and indicators, as well as the controlling switches, are located on the dash-board. In some of the larger airplanes some of the instruments are duplicated, because these machines are intended for two pilots sitting side-by-side and alternating in the control of the flight.

In the middle of the dash-board is the altitude indicator, reading to 2,800 meters (about 8,500 feet), the greatest height attainable by this type of machine. In front of each pilot is an air-speed dial, which indicates the speed with which the supporting air current strikes the controlling surfaces of the airplane. For each of the four engines there is a separate dial indicating the number of revolutions up to 2,200 a minute, and another dial showing the temperature of the cooling water. Near the lower edge of the dash-board, between the two pilots, is the position indicator.

Among the control switches on the dash-board are those for lighting the various dials

and instruments, for electrical light and sound signals, for navigation lights, and for turning on and off the current in the electrically heated garments of the pilots when they are exposed to the intense cold of the higher altitudes. There is also a clock, a two-button switch for the landing lights near the altimeter, and two switches for the radio apparatus.

SAFEGUARDING THE ROLL-FILM EXPOSURES.

There have been so many inventions of late bearing upon the preventions of double exposures on roll-film that it seems but a short time before some make of camera will incorporate this feature. Such a device is absolutely necessary in most cases, because one of the most frequent mistakes made by the amateur photographer is to forget to turn the film, thereby making a second exposure on the first. There are a number of these inventions, most of them taking the form of a locking device engaging with the film-winding in such a manner that when the first exposure is made the shutter is locked. To make another exposure the operator must turn the film key, thus bringing a fresh section of the film into position and unlocking the shutter. Others merely indicate that the exposure has been made, and it is necessary for the operator to wind the film and then reset the indicator.

ALFRED T. MARKS.

NOTES.

The *Board of Trade Journal* publishes the following particulars relative to the present position of the Sugar Industry in France:—Of the 206 sugar factories which were in operation in France during the years 1913-14, 72 were totally destroyed and 59 put out of action under the German occupation. According to the "Journal des Contributions Indirectes" 28 factories of the Somme and 26 factories of the Aisne were razed to the ground, while factories in the Nord were more or less pillaged, and the plant taken away. At the commencement of the 1919 sugar season only 60 factories were able to undertake work in these areas. The reduction in production has thus been quite appreciable. Production for the season preceding the war was about 717,228,946 kilogrammes (1 kilo = 2.2046 pounds). The estimates for the present season are actually about 150,000,000 kilos. It is true that there is a Colonies production, but unfortunately the Colonial which were formerly able to supply about 100,000,000 kilogrammes have been obliged to reduce their export, not only because of the difficulties of freight, but also on account of the high prices of alcohol, due to the State control over that industry, which have induced the French Colonies to produce more rum, to the detriment of sugar. During the last season imports from the Colonies fell to 54,000,000 kilogrammes. The rise in prices and compulsory restrictions naturally reduced the consumption, but nevertheless it became necessary to draw on foreign production. In 1918-19, foreign imported sugar amounted to 367,000,000 kilogrammes, of which 150,000,000 came from the United States, 101,000,000 from Cuba, and 38,000,000 from the Dutch East Indies. In order to re-establish the industry it has been suggested that the number of factories should be re-

duced, and the average production of the remaining factories should be increased, in order to diminish costs, and for this purpose it would be necessary to place the factories in those areas where the best conditions prevail for supplies of beetroot and alcohol. It is considered, however, that German competition must be faced eventually. In Germany the whole of the beetroot crops is reserved for the sugar industry, whereas in France manufacturers of sugar and distillers compete for crops, prices of which gradually increase. In Germany, distillers are supplied exclusively by potatoes and grain. The French State monopoly of the alcohol industry will involve competition between the Minister of Finance and the sugar producers, and in order to secure an adequate supply of alcohol the price to be offered by the State will have to be sufficiently remunerative. The price of industrial and other alcohol in France will consequently fix the price of sugar. According to official statistics the area under sugar beet fell from 249,349 hectares (one hectare = 2.47 acres) in 1913 to 76,720 hectares in 1917.

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A company has been formed in Japan with a capital of yen 2,000,000 to manufacture pulp from seaweed. Its prospectus states that the quantity of pulp annually consumed in the country as material for making paper is nearly 300,000 tons, including what is produced in Japan and importations. Paper mulberry (*mitsumata*), hemp, rice straw, etc., are used in Japan as material for paper. Of late, however, wood pulp represents 70 or 80 per cent of the total quantity of material used. Wood pulp is actively produced in the Hokkaido and Karafuto, but as the wood, when felled, is not restored to its old condition until several dozen years have elapsed, it is considered by this company that the wood available for the making of pulp will get more scarce as time goes on. The company has a patented

process of manufacturing pulp out of seaweed of the name of "ajimo," of which there is an inexhaustible supply around the coast. Its growing power is said to be so great that four or five months after being cut off it is found to be ready for another gathering. In addition to its power of rapid growth, another convenient feature of this weed is that it grows collectively, and its great vitality prevents other weeds from growing near the place where it is found, thus making the process of gathering easy and convenient. The company compares the cost of production with the cost of wood pulp, as under:—

Sen.

Cost of production of sulphite wood pulp (Hokkaido) ... 10.4

Cost of production of crushed wood pulp in Japan proper (used as material for paper for newspapers, etc.) 6.5

Cost of production of "ajimo" pulp (material for Japanese paper and superior European-style paper) ... 4.8

Average market price of native pulp (produced in Karafuto) ... 14.5

Average market price of imported pulp ... 20.0

Probably sale price of "ajimo" pulp. 8.5

The objects of the company are given as:—

- (1) The manufacture and sale of pulp.
- (2) The manufacture and sale of paper.
- (3) The manufacture and sale of machine for making paper or machines for making material for paper.

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In the *Revue D'Economic Politique*, for November—December 1919, of which we have received a copy through the courtesy of its founders, Professors Charles Gide, Alfred Jourdan and Edmond Villey, the well-known French economists, the position of France in connection with the Treaty of Peace is dwelt with under six different heads. The

financial clauses are commented on by Mr Henri Truchy, the Economic clauses by M. F. Sauvaire-Tourdan, the labour. clauses by Mr. Octave Festy, the Colonial clauses by Mr. Arthur Girault and the African clauses by Professor Charles Gide. The French Financial situation gets further attention at the heads of M. Georges Lachapelle. Altogether this number of the *Revue* may be termed the Treaty of Peace number Needless to add the articles are full of suggestive remarks and shrewd observations, which ought not to surprize any body when the position and status of the writers in the economic world is remembered.

We note some further correspondence on the subject of sugar production in India. In the *Tropical Life* for February, Dr. C. A. Barber answers Mr. H. H. Smith's letter in that journal. Dr. Barber refers to Mr. Subba Aiyar's article in this *Journal* and says that he is "in cordial agreement with his gentleman." All the same Dr. Barber reiterates his opinion "that there is not immediate prospect of India's contributing to the world's sugar supply, if indeed she succeeds in producing enough for her own needs." Every one would do well to await the Report of the Indian Sugar Committee in this and other matters relating to the possibilities of increasing sugar production in India.

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Prospects are entertained that the American candy or confectionary trade will show rapid growth with the disappearance of the liquor trade. A study of the working conditions in candy-making, issued by the Director of the Women's Bureau of the United States Department of Labour, shows the weekly earnings of girls in candy factories in Philadelphia. The total output of candy in the United States, according to the last census (1914) was valued at 170,000,000 dols., of which the total pay roll amounted to 25,500,000 dols. for 53,558 wage earners employed in 2,391 factories. Every State

in the Union has at least one confectionery establishment, the Women's Bureau states, but the largest number of wage-earners are employed in the manufacturing States of New York, Massachusetts, Pennsylvania, and Illinois. In Philadelphia the factories employ 3,415 candy-makers. An average of a little over 400 dols. per year, the report shows was paid to candy workers in 1914. In 1919 the average rate in Philadelphia was not quite 450 dols. per year. The outstanding features of the candy trade from the workers viewpoint are, according to the report of the Women's Bureau:—

Very low wages.

A dull season of four months when only about one-half of the employees are at work.

Most of the workers are women.

Most of them American born.

Most of them young.

Most of them contribute to the support of others.

Unsatisfactory and inadequate sanitary provisions.

High labour turnover.

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According to the Colonial Report on British Guiana for the year 1918 the sugar crop of the Colony was a little below the average, being 107,539 tons, as compared with 108,422 tons, the average annual yield of the preceding seven years. Owing to freight difficulties only 93,001 tons were exported during 1918. The returns submitted by sugar-estates in the Colony show that in 1918 more than nine-tenths of the total area—73,565 acres—under sugar-cane was planted in varieties other than the Bourbon. Only 3,500 acres are now occupied by Bourbon unmixed with other varieties. Of the area, estimated at 69,000 acres, cultivated in new varieties, 92 per cent was under canes raised from seed in this Colony, while about 7½ per cent was occupied by varieties imported from Barbados. Of the total area in cane cultivation, 78 per cent is occupied

by new varieties raised at the George town Botanic Gardens. According to the same Report coconuts were planted on 29,400 acres of land, whilst the acreage in 1919 was 23,900. The export of nuts decreased from 1,911,000 to 1,516,000 but in addition 2,487 cwts. of copra and 20,650 gallons of oil were exported. By far the greater number of the nuts grown, returned by the growers at 14,217,000, were used locally for the manufacture of oil or directly as food. There is still a very wide area of land suitable for the planting of coconuts, on parts of which extension of such planting is being actively carried on. Under proper cultivation and drainage the yearly crop will be very largely increased in the near future.

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It is generally assumed in the German Press that apart from the danger of an "economic war" on Germany, there is also what is termed a "psychological epidemic" with which entire nations are afflicted. This is resolving itself into an aversion for everything German, which will continue for some time to lead to a situation in all economic life similar to a state of war. To overcome this prejudice many suggestions have been made, some of which have been carried out. The first was the idea of selling German merchandise under the trade-marks of neutral countries. This, it is stated, has necessarily been abandoned. Another project is the establishment of branch factories in neutral countries. But here again, Switzerland, for example, has taken measures to prevent articles produced by such branch plants from bearing marks indicating Swiss manufacture. Such articles are not admitted to the Sample Fair at Basle, and it is anticipated that there will be future legislation, at least in France and England, to prevent the entrance of these pseudo Swiss products. It is hoped, however, that it may be possible to overcome these difficulties by founding in neutral countries local (national) firms under the control of dummy directors. For the

period immediately following the war, at least, it is urged that everything points to the neutral as the proper representative of German firms. He can enter France and England without difficulty, and can sell his customers German goods, which naturally speak for themselves.

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Exhibitions in connection with the fifth British Industries Fair were opened at the Crystal Palace and in Glasgow and Birmingham on February 23rd. The classes of goods on view at the Crystal Palace, where the stalls extend to five miles and cover an area of twenty acres, include cutlery, silver and electro-plate, jewellery, clocks and watches, glassware, china, earthenware, paper, stationery, printing, fancy leather goods, brushes, toys, sports goods, scientific instruments, optical and photographic goods, drugs and druggists' sundries, musical instruments, furniture, and art needlework requisites. The exhibits in Birmingham consist largely of machinery, metalware, hardware goods, and household utensils. Features at Glasgow are clothing, general textiles, food-stuffs, and chemicals. Admission is restricted to business men, of whom 150,000 were invited. The *Board of Trade Journal* mentions that the Fair has been well attended from the opening, not only by British trade buyers but by overseas representatives, including buyers from South Africa, Netherland East Indies, the United States, Finland, and on behalf of the Esthonian Government, as well as from European allied and neutral countries. It is announced that four travelling exhibitions of British goods are to be established for the Overseas Dominions, the Far East, the United States and South America. In addition, the opening of show-rooms on the Continent and elsewhere for the display of British productions is under consideration by the Government.

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There are rumours of the probable early appointment of a permanent Trade Commis-

sioner in India by the United States Government, although so far the American Consulate in Calcutta is without definite news on the subject. In this connection, however, it is of interest to observe that Mr. W. H. Rastall is now visiting India as a Special Trade Commissioner of the United States Government to investigate the prospects for the extension of the sale of American machinery. Mr. Rastall is a mechanical engineer, who during the war was in charge, in Washington, of the aircraft productions of two of the American States, and he was despatched on this special mission to the East just before the Armistice was signed. He came to India *via* Java and the Straits Settlements, and proposes to stay four months, then proceeding to China and the Far East. Up to the present, with the exception of the American Consular Officers in Calcutta and Bombay, virtually no commercial work has been conducted on behalf of the United States Government in India, but this mission and the probability of the appointment of a permanent Trade Commissioner would seem to indicate a determination to foster trade officially, and to presage still keener American competition in the Indian markets.

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As a result of the recommendations in the Indian Industries Commission interim report, the general orders regarding terms and conditions on which Ceylon Government Agents may allow grants of Crown land to plumbago prospectors have been amended and revised. Hitherto lands were put up for public auction. In future they will be granted on payment of a royalty per ton, and facilities will be given to lessees to get into possession of the land promptly. The procedure to be adopted is: When a prospector believes a certain piece of land to contain plumbago the Revenue Officer will be authorised to allow him to have the boundaries of the land which he applies for to be permanently defined and marked on a

plan to be handed to the Revenue Officer, and the Inspector of Mines are to determine the value of the land. The Revenue Officer is then authorised to accept the first annual payment and allow mining operations to begin. In the event of the potential value of the plumbago deposits being difficult to be ascertained the lessee may be called upon to pay royalty on plumbago removed. The leases are to be taken for periods of 15 years and not for 5 years as was the case before.

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A Resolution of the Government of India in the Finance Department, dated the 15th March, 1920, says:—In consequence of the acceptance of the recommendation of the Indian Exchange and Currency Committee that the exchange value of the rupee should be fixed at one-tenth of the gold content of a sovereign, the Government of India have, with the approval of the Secretary of State for India, decided that the rate of Rs. 10 to the £ shall be adopted for the conversion of sterling transactions into rupees and *vice versa* in all Government accounts and statistics with effect from the 1st April, 1920. The Budget estimates for the year 1920-21 have been prepared on the basis of the 15-rupee rate, but they will be recast on the new basis as soon as possible after the first April. The new rate of Rs. 10 to the £ will also be applied to the expression "sterling," as far as practicable, in all official documents and correspondence from the 1st April, 1920. Gold, coin and bullion, however, will continue until further orders to be valued at Rs. 15 per £ in all Government accounts and returns inclusive of the accounts of the Paper Currency and Gold Standard Reserves.

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A Yokohama report on the cotton market states that Japanese spinners, having sold a head cotton yarns as far as October, 1920, or March, 1921, need a proportionately greater amount of raw cotton, and are said

to have purchased American cotton of some 70,000 bales at 29-30 cents. The total purchases of cotton by them since the new crop season are placed at 520,000 or 530,000 bales. Chinese cotton bought up to the present is put at 50,000 bales, and the new crop of Indian cotton purchased in the meantime at 400,000 bales. When these figures are put together, the total comes to some 1,000,000 bales, and when American cotton to the extent of 200,000 bales, Indian cotton of 400,000 bales, and Egyptian cotton of 20,000 bales are purchased in addition, the Japanese spinners will be supplied sufficiently for next year. Negotiations are going on for the buying of Egyptian cotton, and as the quotation is so high as about yen 150 delivered in Japan, no noteworthy business has been done as yet.

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Samples and photographs of a Danish invention, together with a report for impregnating cement, may be seen at the Enquiry Office of the Department of Overseas Trade, 73, Basinghall Street, E. C. 2. It is understood that the process is regarded as having established its claim to practical utility, and that besides the purchase of the rights by a well-known Danish company, the invention has already been taken up by a Norwegian company. Negotiations are also being carried on for the sale of the invention in Sweden, Holland, Germany, United States of America, the Argentine, and Mexico. The invention consists in the composition of a fluid in which the cement pipes are dipped, and it is claimed that the fluid thoroughly impregnates the pipes, which become thereby as serviceable for drainage and similar work as the glazed earthenware pipes generally used.

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What is regarded as the first commercial de-hydrating plant for wine grapes in the world is now in operation in Pomona, California. At the end of the first 24 hours it had handled ten tons of wine grapes, which would otherwise have been useless because, it is stated, of their over ripe and broken condition caused by recent rains. The owners of the plant assert that after fruit has passed through this de-hydrating process, it can be kept indefinitely, and when again placed in water the empty cells will refill and the grape or apricot, as the case may be, will be restored to its original condition.

GLEANINGS.

Briquettes are now being made from waste wood products, as sawdust and shavings. It is found that under pressure these materials can be briquetted without a large percentage of binding material, but where this is used it is found that waste and spent grian from breweries can be used. The plant required consists of a drying apparatus, a press and baking oven, and about 16 h. p. is all that is required to work the presses. The briquettes are comparatively light, and are of the slow burning type, and their use is principally for keeping furnace fires alight during periods when little or no pressure of steam is required. It is said that about 10,000 kilogrammes of the briquettes are equal in heating power to about 6,000 kilogrammes of steam coal.

The Supervisor of the Forest Service of Alaska declares that the territory has enough timber to furnish one-half the newsprint paper of the United States for an indefinite period, and that with proper care the industry could be made inexhaustible. This is of especial interest in view of the approaching disappearance of supplies in the Eastern forests, and financial interests have been already looking over the field. In the event of the project taking shape, and the removal by Congress of certain Government restrictions, which at present block the way of some mill plants, it is expected that American mills will be established at Ketchikan and Juneau, which it is hoped will equal the record of some mills across the Canadian border.

A concession has been given by the French Government for the formation of a company to develop the cotton-growing industry in French West Africa. According to the Decree authorising this concession, published in the "Journal Officiel" of 4th December, the company is to be constituted

under French laws, with an initial capital of two million francs, this capital to be increased successively to ten and twenty million francs. The area marked for irrigation is 100,000 hectares in the basin of the Niger, exclusive of the areas drained by the tributaries of lakes Horo, Fati, Tele, Faguibinu, and Daounas. British firms requiring further information on the terms of the concession should apply to the Department of Overseas Trade.

The recent success of the aerial mail trials between Tokio and Osaka has demonstrated to the Japanese Government the possibilities of civil aviation, while the advances made in international aviation in other parts of the world, coupled with the probability of Japan being involved at no distant date in questions of aerial jurisprudence, have roused the Cabinet to the realization of the immediate necessity of providing machinery competent to deal with the new developments. A Special Committee therefore has been instituted as a temporary measure pending the approval in the Budget Estimates of the creation of a permanent "Aviation Board." It is expected that the latter will be established by April, 1920.

The Johannesburg Town Council, having given the site for a University, has granted £10,000 per annum towards its maintenance. The object of the institution will be to provide education of a scientific, technological, and commercial character best directed towards the industrial and commercial development of the resources of the Union. The Union Government is to be asked to increase its contribution of £26,000. The Chamber of Mines and the Rand municipalities support the scheme. The erection of the Medical College has been started, and already there are 31 departments at the School of Mines.

"The excess of American exports over imports has grown out of bounds," in the opinion of Philip B. Kennedy, whose first annual report as Director of the Bureau of Foreign and Domestic Commerce, Department of Commerce, was published recently.

A Swiss cycle merchant who bought a number of German bicycles recently, states that he will buy no more, as the cycles break the pieces.

ECONOMIC NOTES.

INDUSTRIES AND COMMERCE.

Manufacture of Packing Paper from Spent Wattle Bark and Wood Chips.

We publish below (1) the Interim Report by the Imperial Institute, London, in December, 1917, on the use of spent wattle bark and wattle wood as paper-making materials, and (2) the Report of the Chemical Waste Products Committee of the British Munitions Inventions Department, dated February, 1919, on the utilization of wood chips for the manufacture of packing paper with additional information on the utilization of mimosa bark :—

I.

Interim Report by the Imperial Institute on the use of Spent wattle bark and wattle wood as paper making materials.

SPENT WATTLE BARK.

An investigation has been conducted at the Imperial Institute in order to determine the value as a paper-making material of spent wattle bark, *i.e.*, the residual bark after use by tanners or tanning-extract manufacturers. A sample of the material was submitted to preliminary tests in the Scientific and Technical Department of the Imperial Institute and subsequently large scale trials were made by paper manufacturers. The results so far obtained are of very promising character and are summarised in the following statement.

The material as received at the Imperial Institute was found to contain 11.5 per cent of moisture, 41.2 per cent of cellulose, and 8.7 per cent of ash. On extraction with hot water the bark lost 7.0 per cent by weight.

The ultimate fibres of the material measured from 1.0 to 2.2 mm. and were mostly about 1.7 mm. in length.

The spent bark was converted into pulp by the soda process with the following results :—

Experiment No.	Caustic soda used		Conditions of boiling		Parts of Soda consumed by 100 parts of bark	Yield of dry unbleached paper pulp expressed on the material as received (per cent)
	Parts per 100 parts of bark	Parts per 100 parts of solution	Time in hours	Temperature		
1	20	4	4½	140°C	14	28
2	16	4	4	140°C	14	34
3	12	4	4	140°C	all consumed	35

When treated under the conditions of experiment 2, the bark was sufficiently boiled to beat easily, and gave a dark brown pulp which yielded a fairly soft, opaque paper, of fair strength and quality, which did not shrink appreciably on drying. The pulp bleached readily but only to a cream colour.

The pulp from experiment 3 was not sufficiently boiled, and the fibres were not completely separated even after long beating. Such long-fibres pulp has been recommended as a material for the production of roofing felt.

The treatment used in experiment 2, therefore, appeared to be the most suitable for the preparation of "half-stuff" from the bark.

Although the yield of unbleached pulp from the bark is somewhat low, the material is fairly promising as a source of pulp for the production of brown paper and may be suitable for the cheaper grades of white or cream papers such as newspaper.

As large quantities of spent wattle bark were becoming available in the United Kingdom owing to the increasing use of wattle bark by British tanners, it appeared desirable to have large scale trials made with the material by paper-makers.

Three tons of the spent bark were therefore obtained from a firm of tanners and submitted to paper manufacturers for technical trials. The manufacturers reported that the dry bark furnished from 28 to 30 per cent of pulp, which would be quite suitable for the manufacture of brown paper.

The paper made entirely from the wattle bark under manufacturing conditions was regarded by the manufacturers as a very satisfactory wrapping paper of good strength and excellent folding qualities.

In view of the present high price of brown paper the current value to the United Kingdom of the spent bark, containing not more than 10 per cent of water, would be about £4 per ton delivered at a mill, but in normal times it would not be worth more than 30s. per ton. Arrangements are now being made by makers of brown paper in the United Kingdom to utilise the supplies of the spent bark which are becoming available from the tanneries.

Further enquiries are also being made by the Imperial Institute as to the possibility of utilising the pulp, after bleaching, for the production of cheap grades of cream or white paper, but this point is not yet definitely established.

WATTLE WOOD.

It seemed possible that the wattle wood obtained in the production of the bark might also be utilised for paper-making and trials have accordingly been made at the Imperial Institute.

A sample of black wattle wood was found to yield 61.0 per cent of cellulose and 0.5 per cent of ash, expressed on the dry material. The ultimate fibres measured from 0.8 to 1.1 mm. in length. The wood was converted into pulp by the soda process with the following results :—

	Caustic soda used		Conditions of boiling		Soda consumption per cent	Yield of dry unbleached pulp expressed on the wood as received per cent.
	Parts per 100 parts of bark	Parts per 100 parts of solution	Time	Temperature		
A	16	4	4 hrs.	140°C	11	46
B	14	4	7 hrs.	140°C	10	50

The wood yielded a clean pulp of light brown colour, giving an opaque paper which did not shrink on drying but was lacking in strength, owing to the shortness of the ultimate fibres.

The conditions employed in experiment A produced a pulp of lighter colour than that obtained in experiment B. The pulp did not bleach well in either case, but that from experiment A bleached better than that from B.

With a view to ascertaining whether the sulphite process would give better results the wood was also treated by this method with the following results :—

Strength of sulphite liquor 100 parts contained the equivalent of		Conditions of boiling		Yield of dry unbleached pulp, expressed on the wood as received per cent
Lime (CaO)	Magnesia (MgO)	Time	Temperature	
0.7	0.3	7 hrs.	150°C	48

As is generally the case, this process produced a pulp of much lighter colour than the soda process. The unbleached pulp was a light greyish-brown and bleached easily to a creamy white tint. The paper produced was similar in strength to that obtained by the soda process.

A firm of paper manufacturers who were consulted by the Imperial Institute as to the possibility of utilising wattle wood in the paper-making industry expressed the opinion that it could be advantageously used for making "straw-board." They considered that a mixture of 50 per cent of wattle wood and 50 per cent of spent wattle bark should give a good "straw-board" which would probably find a ready market in South Africa for the packing of fruit and other purposes.

The foregoing results show that black wattle wood gives a very fair yield of pulp, but that owing to the shortness of the ultimate fibres the paper produced is of rather poor strength. It should however be possible to utilise the pulp, as suggested above, in connection with other materials of longer fibres, such as the pulp from spent wattle bark.

II.

Report of the Chemical Waste Products Committee of the Munitions Inventions Department on the utilization of wood chips for the manufacture of packing paper with additional information on the utilization of mimosa bark.

EXPERIMENTS WITH WOOD CHIPS, INCLUDING BARK.

As the erection of a soda or sulphate plant for the conversion of wood chips, including bark, into cellulose, is not a commercial proposition, the experiments with this material have been confined to processes which can be conveniently carried out in most of the paper mills manufacturing brown wrapping papers. High pressure boilers as a rule are not available in such mills, and the chips have therefore been boiled under a pressure not exceeding 45 lbs. per square inch. The most satisfactory paper as

regards strength and appearance was obtained by treatment of the material in the following manner:—

The air dry wood chips, including bark, were boiled with 22 per cent of caustic soda (strength of the boiling liquor 7°Tw.) during 12 hours, under steam pressure of from 40 to 45 lbs. per square inch, in a stationary boiler. The boiled chips were then washed and broken for 3 hours and beaten for 5½ hours. The total yield of paper was 49.3 per cent calculated on the air dry material; the yield is, therefore, a very satisfactory one. Tests made with this paper gave the following results:—

Thickness	...	...	127 mm.
Bursting strain	...	...	36,000 lbs. per sq. inch.
Breaking strain (machine way)	6.2 kilograms		
Breaking strain (cross way)	...	3.4	..
Elongation (machine way)	...	1.6	per cent.
Elongation (cross way)	...	5.0	per cent.
Folding resistance (machine way)	...	...	142
Folding resistance (cross way)	...	...	132
Weight of paper	...	...	82.51 grms. per sq. metre.

Wood waste could most satisfactorily be dealt with, with a minimum outlay of capital, by working the necessary chopping machinery in the places where the wood waste is available. There should be no difficulty in finding paper manufacturers who would be willing to buy the chopped waste and to use it in conjunction with other paper-making raw materials in the manufacture of brown papers.

Satisfactory results should, for instance, be obtained by using this waste in conjunction with mimosa bark.

EXPERIMENTS WITH BRANCHES FROM DIFFERENT WOODS FROM SCOTLAND INCLUDING YOUNG BIRCH AND OAK.

The branches, with the bark, were chopped and mixed. The following treatment produced the most satisfactory paper:—

The chopped branches were boiled with 20 per cent of caustic soda (strength of the boiling liquor 8°Tw.) for 12 hours, under a steam pressure of from 40 to 45 lbs. per square inch. The boiled chips were then washed and broken for 2 hours, beaten for 4 hours and finally run on the machine. The stuff was very free and the yield of paper about 35 per cent calculated on the air dry logs. Tests made with the paper gave the following results:—

Thickness	...	...	22 mm.
Bursting strain	...	...	33.2 lbs. per sq. inch.
Breaking	..	(machine way).	5 kilograms.
"	..	(cross way)	3.3 ..
Elongation (machine way)	...	3.4	per cent.
"	..	(cross way)	4.8 per cent.
Folding resistance (machine way)	62		
"	..	(cross way).	38
Weight of paper	...	...	88.5 grms. per sq. metre.

Although the breaking strain is satisfactory, the resistance of the paper to folding is very low, *i.e.*, the paper is very brittle. This material, by itself, could not be recommended as a satisfactory paper-making raw material, but it should be possible to employ it as a suitable filler along with more fibrous materials. The brittleness of the material is no doubt due to the fact that it contains a much larger percentage of bark, as compared with the wood chips used in the other experiments.

MIMOSA BARK.

The waste bark, as received from the tanner contains 75 per cent of water, *i.e.*, 100 lbs. of wet bark yields 25 lbs. of the air dry material. If, therefore, the waste bark has to be carried a considerable distance, the tanner should be advised to spread it out and air-dry it as far as possible. If the paper mill is within easy distance of the tannery drying would not only be unnecessary, but it would be preferable to send the bark to the mill in the wet state because the wet bark will more readily respond to the treatments in the paper mill than the dry bark. Numerous experiments in boiling the bark were carried out, but the following was found to give the most satisfactory results:—

The waste bark was boiled with 10 per cent of caustic soda, calculated on the dry weight of the bark, for 5 hours, under a steam pressure of from 20 to 25 lbs. per square inch, in a spherical revolving boiler. The pulp obtained was perfectly soft and of a dark brown colour. The boiled material was washed and broken for 1½ hours, care being taken to retain the brown colouring matter as far as possible. It was finally beaten for 4½ hours, and after a small quantity of resin and alum had been added, was converted into paper on the Fourdrinier Paper Making Machine. The total yield of paper calculated on the air-dry material was 38.5 per cent. Boiling of the wet bark in a stationary boiler in place of a revolving boiler may be suggested, and would probably give a somewhat higher yield.

Tests made on this paper gave the following results:—

Thickness	...	...	214 mm.
Bursting strain	...	...	20.8 lbs. per sq. inch.
Breaking strain (machine way).	3.6 kilograms		
„ „ (cross way)	2.5	„	
Elongation (machine way)	2.2 per cent.		
„ (cross way)	2.18	„	
Folding resistance (machine way)	26		
„ (cross way)	17		
Weight of paper	...	...	70.44 grms. per sq. metre.

In another experiment a quantity of waste bark was boiled; material was somewhat darker in colour than that produced by boiling with caustic soda. After boiling, the material was broken for 2 hours and beaten for 4½ hours. The total yield of paper was about the same as that obtained from the pulp boiled with caustic soda, but it should be pointed out that the pulp obtained by the lime boil does not run as well on the paper machine as that obtained by the soda boil. Test made with the paper from the lime boiled pulp gave the following results:—

Thickness	...	...	375 mm.
Bursting strain	...	...	11.5 lbs. per sq. inch.
Breaking strain (machine way).	1.9 kilograms.		
„ (cross way)	1.4	„	
Elongation (machine way)	.75 per cent.		
„ (cross way)	.92	„	
Folding resistance (machine way).			
„ (cross way)	...		
Weight of paper	...	...	144.5 grms. per sq. metre.

The figures show that the bark when boiled with lime produces a paper which is much inferior to that produced by boiling with caustic soda; it is very brittle, and the breaking strain is very low.

Whilst a fairly useful paper can be produced with the bark alone, much better results may be obtained if it is used in conjunction with other paper-making raw materials. In a further experiment, paper was made from mimosa bark, soda boiled 33 per cent, mimosa bark, lime boiled 25 per cent, waste paper 30 per cent and jute 12 per cent. The mixture was beaten for four hours, and was lightly sized with

resin before running on the machine. This produced a very useful wrapping paper, tests of which gave the following results:—

Thickness	...	...	277 mm.
Bursting strain	...	...	25 lb. per sq. in.
Breaking strain (machine way.)	5.67 kilograms.		
„ (cross way)	3.0	„	
Elongation (machine way)	1.65 per cent.		
„ cross way	1.93	„	
Folding resistance (machine way)	18		
„ (cross way)	17		
Weight of paper	...	...	103.0 grms. per sq. metre.

Considering the results obtained with the soda boiled bark alone, it is, therefore, safe to assume that a good wrapping paper can be produced by using from 60 to 65 per cent of soda boiled bark with the addition of waste paper and jute as above, or with addition of jute only. Other raw materials employed in the manufacture of brown papers may however be usefully employed in conjunction with soda boiled mimosa bark.

COTTON-GROWING IN THE BRITISH EMPIRE,

It will be remembered that a Committee was appointed in July, 1917, by the President of the Board of Trade, London, "to investigate the best means of developing the growing of cotton within the Empire and to advise the Government as to the necessary measures to be taken for this purpose." The Report of the Committee has just been issued as a Parliamentary White Paper (Cmd. 523, 1s. 6d. net) and may be seen by visitors at the Commercial Library and Reading Room at No. 1, Council House Street, Calcutta. The Report is in two parts, Part I giving the general views of the Committee and setting forth their general plans and proposals for the development of the Empires' resources for cotton growing and Part II containing a detailed survey of the position both present and prospective in the various territories of the Empire, which

are considered suitable for the cultivation of cotton.

PA R T II.

GENERAL CONCLUSIONS AND RECOMMENDATIONS.

The General Conclusions and Recommendations of the Committee are as follows:—

"In putting forward our conclusions and recommendations we have to admit that they are to a large extent provisional in their character. We are convinced that it is possible for the British Empire to make good the world's shortage of cotton, but the one conclusion that stands out plainly and definitely as the result of our work during the past two years is that this achievement is beyond the powers of this or indeed of any Committee. It can only be accomplished by the united efforts of the Imperial Government and the Governments of the cotton-growing Dominions, Colonies, and Protectorates, supported by the active interest and cordial co-operation of all who are engaged in the Cotton Industry in this country.

Our general recommendations are as follows:—

- (1) That the Empire Cotton Growing Committee be authorised to continue its work on the general lines of the present Report, and that a grant be made to it by the Treasury of a sum of not less than £10,000 per annum for five years to pay for its secretarial and other current expenses and for any outlay that proves to be necessary for initiatory work in directions connected with the objects of the Committee.
- (2) That the immediate importance of greatly enlarging and strengthening the Agricultural Departments of British Colonies and Protectorates be recognised as a preliminary step essential to any rapid progress, and that the Colonial office be respectfully recommended to appoint a committee to advise on the scale of numbers, salaries, and general expenditure which should be aimed at for adoption as and where circumstances permit.
- (3) That, in order to supplement the present knowledge of scientific principles underlying cotton growing, a Central Research Institute be established as soon as possible for their investigation.
- (4) That, in order to increase the supply and improve the training of scientific men, financial provision be made for at least four Readerships at British Universities

in Plant Physiology, Plant Genetics, Mycology, and Entomology; that funds be provided for the awarding of Research Studentships to be held for one or for two years by graduates who are selected for training in methods of Research in this and other sciences concerned with study of the living plant; the number of these to be five to begin with, but to be gradually and considerably increased before long.

- (5) That we should establish a Bureau for the interchange of knowledge of cotton growing and should arrange for the publication of a Quarterly Review devoted to this subject.
- (6) That the Governments of all cotton-growing areas in the Empire be advised to take full powers for exercising strict control over all essential matters connected with cotton growing.
- (7) That, where it is possible and seems desirable, such Governments be recommended to establish local Associations of cotton growers to advise their Government upon matters of general interest to the industry.
- (8) That an agreement should be negotiated with the British Cotton Growing Association, in accordance with which that body will act as agent for the Empire Cotton Growing Committee for marketing crops where this is desired by the local Government; that it should be a condition of this agreement that the British Cotton Growing Association shall forego the appropriation of any profits made in the business carried on under the agreement, provided that the Association is guaranteed against permanent loss arising therefrom.
- (9) Finance.—That funds for the promotion of cotton growing in the Empire should be provided from the following sources:—
 - (a) The British Treasury.
 - (b) The local revenues of cotton-growing areas.
 - (c) The Cotton Industry.

That the following general principles be accepted as a guide in discussion and in negotiations as to the allocation of financial responsibility to each of the above sources:—

- (a) That the British Treasury may fairly be looked to—
- (1) To provide for the secretarial and establishment charges of the Empire Cotton Growing Committee, and for outlay for

initiatory work in directions connected with the objects of the Committee.

(2) To contribute—in some proportion to be agreed—towards expenditure upon schemes approved by this Committee which have for their object the provision of the raw material upon which the great national industry of cotton manufacture depends.

(3) To assist the Governments of Colonies and Protectorates—either by grants or more probably by guarantees—to provide funds for public works, such as railways, waterways, irrigation and harbour works, necessary for the development of their resources.

(b) That where developments, although in their inception they may be connected with cotton growing, are calculated to extend the general prosperity of a Colony or Protectorate, they should as a rule be financed by the Colonial or protectorate Government.

(c) That where the growing of cotton is promoted in preference to other profitable crops, and where pioneer work is undertaken in order to ascertain whether cotton can be grown profitably, the consequential expenditure should be at the charge of the Cotton Industry.

(10) That the Committee be authorised to ascertain the opinion of the Cotton Trade of this country in regard to these recommendations, and in particular upon what lines effective co-operation in raising the necessary money may be expected from the organizations in which the trade is grouped."

PART II.

SURVEY OF THE COTTON GROWING AREAS OF THE EMPIRE.

The Summary of Special Conclusions and Recommendations is as follows :—

WEST INDIES.

"The crop, though small, is of world importance. We recommend that means should be provided to secure the continuance and, if possible, some enlargement of the Imperial Department of Agriculture. We also recommend that careful enquiry be made as to the best means of replacing the Sea Islands crop of the United States [which is in grave danger of practical extinction].

EGYPT.

(a) The Egyptian crop before the war had reached a total of over 7½ million kantars (or 1,875,000 bales of 400lb.). It has, however, during the war, fallen below 5 million kantars. Having in mind this fact and the particularly serious reduction in the supply of fine cotton generally owing to the loss of the Florida and Georgia (Sea Island) crop, we regard the position in Egypt with peculiar anxiety, and desire to emphasise the necessity of leaving no step untaken to remedy the causes which have led to this decline and to attain the maximum production of which the country is capable.

(b) As quality is of first importance in fine cottons, such as Egyptian, we consider it essential that work should be directed methodically and constantly, not only towards maintaining the quality of the existing varieties but also towards securing and holding in reserve other varieties for introduction when and as expedient.

(c) We would specially emphasise the desirability of proceeding without delay with the measures already determined upon before the war to remedy the unsatisfactory condition of parts of the Delta as regards drainage and the control of excess water.

(d) Concurrently with the completion of these projects, it is of the utmost importance that water should be available for the reclamation and irrigation of the lands referred to as well as of those further north which will be restored to cultivation by the new drainage works. An adequate water-supply is available in the White Nile, and we trust that no time will be lost before adopting the best measures for its utilisation. Until this is done full advantage of the expenditure already incurred in the Northern Delta cannot be obtained.

(e) It is estimated that the measures referred to in paragraph (d) would result in an increase of 3,500,000 kantars of cotton, or about 900,000 bales of 400lb. The magnitude of such a possible increase in the Egyptian crop overshadows, though in no way detracts from, the importance of the prospective increase in Uganda or Nigeria, where some such figure as 100,000 bales may be expected as the result of development work.

(f) Since part of the serious reduction in the average yield of the crop is due to the devastation of the pink boll worm, we consider it essential that no time should be lost in putting into force the measures decided upon just before the outbreak of war to combat the ravages of this pest.

(g) We most cordially welcome the appointment of the new Cotton Research Board in Egypt and hope that every assistance will be given to it and to its endeavours to elucidate the problems affecting the Egyptian cotton crop, in particular, (a) the environment of the crop, specially with regard to water and to the control of insect pests, and (b) the maintenance and improvement of the quality of the seed.

SUDAN.

In our letters to the President of the Board of Trade dated 29th December, 1917, and 17th February 1919, we referred to the importance to Egypt of the Sudan irrigation and accompanying drainage schemes; and we desire to emphasise once more the fact that the irrigation projects in the Sudan form an inseparable part of the comprehensive scheme for utilising to the fullest extent the water supplied by the Nile.

We have heard very full evidence with regard to the Blue Nile Barrage, which would make possible the irrigation of some 300,000 acres of land as a first instalment in the Gezira, with prospects of a further increase to about 1,000,000 acres suitable for cotton growing. We are of opinion that the Gezira is one of the most promising districts for development that we have had to consider; we recognize, however, that, with regard to the utilisation of the Nile, the interests of Egypt have to be considered before those of the Sudan. At the same time we hope that the possibilities of opening up and developing the Tokar and Kassala areas may be carefully considered.

In the Sudan as elsewhere, we consider experimental work to be of the greatest importance. We are glad to be informed that this is fully recognized by those responsible for the Government of this important country.

MESOPOTAMIA.

We are of opinion that the results obtained by the experimental work of the Department of Agriculture are very promising. These experiments, however, were necessarily carried out on a small scale. It is therefore most important that the work should be continued and extended in order to determine whether cotton can be economically produced on a commercial basis. It is essential for this purpose that arrangements should be made to build up a

supply of approved seed for large sowings in 1921, and we have already recommended that the funds required to make this possible should be at once provided by a special grant.

UGANDA.

We recommend that the Agricultural Department should be enlarged, and that the salaries paid to its officers should be substantially increased, so as to retain those already employed, and to attract men of ability to the service.

Continued attention should be paid to the development of transport facilities, including improved waterways.

We recommend that Government control of the Cotton Industry already established should be maintained.

NYASLAND.

We wish to emphasise the necessity here, as elsewhere in Africa, of strengthening the Agricultural Departments and improving transport facilities.

RHODESIA.

We think it desirable that the possibilities of Rhodesia as a whole should be more fully explored, since, although none of the districts where pioneer work has been undertaken can be regarded as likely to produce a large cotton crop in the early future, they apparently possess possibilities for further development which may prove valuable later on.

The addition of cotton experts to the otherwise well-equipped Agricultural Department is essential before progress can be expected.

THE UNION OF SOUTH AFRICA.

The cotton-growing industry has now emerged from the experimental stage in South Africa. The results obtained indicate that cotton of excellent quality can be grown. We recommend that the valuable work done by the Department of Agriculture should be extended with the object of developing cotton-growing on a much larger scale.

NIGERIA.

We see reason for hope that great expansion may be possible in the growing of cotton in Nigeria, but before this can be attained a large increase in the staffs of the Agricultural Departments will be necessary. We have to reiterate once more the need for an increase in the salaries paid, if these Departments are to be maintained in an efficient state.

We are of opinion that progress equally depends upon the systematic development of the transport systems. Until main line railways can be constructed, we think that efforts should be made to open up the country by other means of transport. We understand that several methods have been tried, and we

would press the authorities to decide upon those most suited to local conditions.

We are of opinion that the work of the British Cotton Growing Association in promoting the commercial development of the cotton crop has been very valuable.

Meanwhile, we recommend that the British Cotton-Growing Association be asked to proceed energetically with its work in the areas in which it is now operating, with a view to increasing the cotton crop to the fullest extent of the capacity of the ginning and baling plant already installed, which appears sufficient to deal with a large increase upon the output of recent years. In this connection we recommend that our Committee should enter into a working agreement with the Association as outlined in Section 26 of this Report.

Exploratory work in new districts, for example in the region of Lake Chad, appears to us desirable, and we recommend that we should assist the local Government in pioneer work.

INDIA.

Following the recommendations of the Indian Cotton Committee, which sat in 1917-18, we advise :—

- (i) That in order to obtain permanent improvements in cotton in India on a commercial scale, more detailed agricultural work, better methods of marketing and handling, and closer co-operation between the Agricultural Departments and the Cotton Trade interests should all be promoted.
- (ii) That more detailed investigations of the existing kinds of plants in cotton-growing areas and more systematic tests of different varieties should be made. The work both of selection and plant breeding, should be conducted solely "by Research officers specially qualified therefor and able to devote their full attention to it." The methods of field tests should be systematised.
- (iii) That special weight be given to (1) the importance of work directed towards the improvement of agricultural practice in its widest sense; (2) the need of staffing, organizing and equipping Agricultural Departments on a scale adequate to carry through widespread demonstration work; (3) the vital necessity of Government control in organizing the selection, supply and distribution of pure seed.
- (iv) That the recommendations to appoint an additional mycologist and to discontinue work on perennial cottons be adopted.

- (v) That the increase asked for in the staff of the Agricultural Departments, which is the minimum that can be expected to discharge the necessary duties assigned to these officers, should be granted.
- (vi) That the possibilities of the Sukkar Barrage Project be re-examined.
- (vii) That with a view to improving the marketing of cotton, market should be established under definite rules and regulations, and co-operative sale by the villagers should be encouraged.
- (viii) That effect be given to the Indian Cotton Committee's suggestions for the licensing of ginneries and presses, and that the needful legislation be introduced. We also support their recommendation that the transport of cotton and waste be controlled.
- (ix) That the proposal to form an East Indian Cotton Association be carried out, since we believe that the formation of an association on the lines indicated would be of benefit to the Indian Cotton Trade, and would be welcomed by similar organizations in other countries.
- (x) That the standardisation of weights on the plan suggested—namely, 28 lb. (avoird.) to the maund, 28 maunds to the khandi—be adopted.
- (xi) That the recommendations for improving crop forecasts be carried out, but that in the interest of accuracy the advisability of securing returns of unpressed cotton delivered direct to mills be considered.
- (xii) That the proposal to form a central Cotton Committee, as outlined in the Report, be put into effect, and that the Empire Cotton Growing Committee work in co-operation with it wherever possible, in the interests of cotton production.

Finally, we would request sympathetic consideration for, and early action on, the various recommendations of the Indian Cotton Committee, which we consider well calculated, both to improve cotton-growing in India and to promote the material benefit of that country."

FIBRE RESOURCES OF INDIA.

The following is an extract from the report on the Progress of Agriculture in India for 1918-19:—

The conditions created by the war have necessitated a thorough investigation of the fibre resources of India. At present, India, and specially Bengal, enjoys a practical monopoly of the world's supplies of jute. In profit to the cultivator and manufacturer, it is doubtful whether any other crop in India can successfully compete with jute, production being far short of the demand. There is, therefore, strong ground for advocating the extension of the cultivation of jute to other suitable localities, and a thorough investigation of the possibilities of growing more extensively other fibre plants also such as sunn-hemp, *Hibiscus cannabinus*, *Sida rhombifolia*, sisal hemp, flax, etc. Work on the improvement of fibre plants (other than cotton), which is in the hands of Mr. R. S. Finlow, has, up to the present, been practically limited to Bengal and Assam. The scope of this work has now been extended to other provinces also, but, his appointment to officiate as Director of Agriculture, Bengal, has prevented Mr. Finlow from entering upon this wider field of enquiry as yet.

JUTE.

Jute continued to be the chief item in the programme of the work of Mr. Finlow. It was stated in last year's report that there appeared to be a considerable variation in the resisting power to *chlorosis* on the part of various races of Jute. Two of the races continued to show the same immunity to this disease as they did last year. It would thus seem that immunity of plants to disease is hereditary in character. Non-chlorotic strains were almost invariably found to be more vigorous and taller than strains subject to *chlorosis*. In variety tests, one non-chlorotic selection (R. 85), a strain of Kakya Bombai (*C. capsularies*), yielded a much better crop than other strains of the race which were chlorotic, viz., $2\frac{1}{2}$ maunds more fibre per acre. About 35 tons of seed of R. 85 will be distributed in the coming season. The work is especially important as there appears to be a considerable danger of the spread of the disease.

Kakya Bombai continued to grow in popularity and the demand for its seed far outstripped the supply. About 55 tons of seed of this variety were distributed in the province in small quantities of $\frac{1}{2}$ lb. for multiplication by the ryots themselves who are beginning to realize the necessity of growing their own seed of new varieties, especially because

of the impossibility of getting seed supplied in bulk by the department. District reports speak of the excellent prices obtained by growers of this new variety, and the premiums obtained for it on account of its quality are probably due to its late flowering habit. The advantages of this habit were fully discussed in last year's report where it was stated that the general adoption of late flowering varieties would tend to improve the quality and yield of Jute. This view is now practically confirmed. The area under Kakya Bombai is increasing in the Jute tract of North Bhagalpur where about 200 maunds of seed were sold and the demand far exceeded the supply.

Kakya Bombai is not, however, the last word in jute selections. One or two other selections of Mr. Finlow promise to rival, if not to beat, Kakya Bombai. Hitherto none has done so excepting the non-chlorotic strain of Kakya Bombay, R. 85, referred to above.

In variety tests with pure lines of *C. olitorius*, R. 26 kept its place at the head of the previously tested races, while a new race (Chinsura green), included for the first time in the test, did extraordinarily well. About 5 tons of the seed of R. 26 were raised during the year for sale and distribution.

Manurial trials on the red soils have yielded more striking results in the year under review and have finally proved that, for jute, lime and potash are both limiting factors and that a normal crop cannot be grown on the red soil without the application of manures containing both of them. The results also serve incidentally to establish the value of hyacinth as a potash manure. The money expended on lime, bone and potash manures practically trebled the net revenue per acre, and in doing so yielded interest at approximately 100 per cent per annum. The results are now considered well established and arrangements are being made to demonstrate them to cultivators.

With a view to ascertain how far the nature of the fibre of the jute plant is affected by details of cultivation, such as the amount of thinning which the crop undergoes, and what the effects of environment are on the quality, of jute fibre, arrangements have been made to carry out important series of experiments at the *mufassal* agencies of certain jute firms. The experiments, if successful, will be of great value both to the agricultural department and to the jute trade in general, as they will answer the question why the different tracts are recognized by the trade as producing characteristic fibre.

In Assam, Kakya Bombai was again tested at the Karimgunj farm against one of the heaviest cropping local varieties and it continued to show its superiority. There is now a growing demand for

this improved variety in both valleys and arrangements have been made to provide a large supply of seed for next year. A manurial test with bone-meal, ground lime stone, hoacinth ash and cattle manure, applied singly and in combination, showed in each case a profitable increase in outturn of fibre.

In Bihar, jute was grown mainly for the supply of seed to Bengal.

Trials with jute were continued at several farms and other places, including jail gardens, in Lower Burma. In Upper Burma, it was grown at Hopin and Nagu with success. On the high garden land of Yedashe farm a yield of as much as 1,100 lb. of clean fibre was obtained, but yield at other places and in jail gardens were not so encouraging. Further trials are being made in the Irewaddy delta, but the growing of jute in this province appears to be a doubtful business proposition on account of the small advantage of profit in its cultivation over that of paddy and the difficulties and expensiveness of labour in Burma.

SANN-HEMP.

The provinces producing sann-hemp on a large scale are Bengal, Bihar, the United Provinces, the Punjab and the Central Provinces, but the crop is grown all over India, either for fibre or as a fodder plant. The fibre from Bengal and the plateau districts of the Central Provinces has the best reputation in the market. Some of the provinces, however, for instance, the Central Provinces, the United Provinces and the Punjab, experience difficulty in the matter of retting water. An artificial process of extraction would not only largely obviate this difficulty but would effect an undoubted gain in nitrogen to the soil; for the amount of nitrogen recovered through avoiding the present wasteful retting process might be as much as 40 lb. per acre, and would open the possibility of green-manuring without loss of a revenue crop. With the aid of a special grant, Mr. Finlow is working in the direction of improving the Method of extraction of sann-hemp and much will depend on his success in solving the problem. Meanwhile, it is gratifying to note that he has succeeded in elaborating a softening process which promises to render sann-hemp fibre fit for use in the textile industries, e.g., for the manufacture of canvas.

Sida.

Experiments with *sida* have been carried on for some years, and a straight-growing plant has now been obtained by Mr. Finlow. The cultivation of *sida* and the extraction of its fibre are similar in all respects to that of jute, the chief difference being that *sida* can be sown later than either jute or *Hibiscus cannabinus*. Its great advantage over jute, for tracts in which the climatic conditions of

Bengal do not obtain, is that, when sown on high land at the beginning of the monsoon it yields a good crop of about 15 maunds per acre of excellent fibre which fetches 20 per cent more than the market rate for first class jute. Trials with *sida* as field crop at Dacca have again given excellent results.

HIBISCUS CANNABINUS.

The improved type known as Pusa 3 is doing well in some foreign countries as well as in India. The preliminary trials given to it by the Agricultural Department of the Union of South Africa proved satisfactory and that department asked for a large quantity of its seed. At Pagu in Burma it gave an yield of 700 lb. per acre.

SISAL HEMP.

Sisal hemp is now produced only in small quantities grown on an experimental scale. At Mandalay, from a plot planted out in 1911, it gave a yield of dry fibre of 840 lb. per acre. An enterprising cultivator is laying out a small plantation under the advice of the Agricultural Department, near Sedaw.

MADRAS COTTON CROP.

Mr. H. C. Sampson, Deputy Director of Agriculture, was good enough to interview the members of the Madras Publicity Board and to read the following interesting paper on the Madras Cotton Crop, which he afterwards discussed with the members of the Board and the visitors who were present:—

MADRAS COTTON CROP.

The cotton crop in Madras has passed through various phases since war was declared in 1914. The first result of the declaration of war was a sudden fall in the price of cotton which fell to such a low figure as hardly to pay the cost of cultivation. The immediate result was a considerable drop in the area grown. The price, however, gradually recovered as the demand for cotton increased. This not only had to meet the ordinary demand for cotton, but also had to meet the demand for munition purposes. In 1917, the price was well above the average pre-war price. As the price rose, the area grown under cotton expanded till in 1918 not only was the area grown in Madras greater than ever before known, but the price also had risen above anything imagined. In the cotton season of 1918 the price of cotton was over a rupee a lb. against a pre-war price of about 6 annas.

Now the normal area of cotton in Madras cannot increase indefinitely. Of country cotton, the possible area is limited by the extent of black-cotton soil. If the whole of this area were sown with cotton, it would mean that this crop was grown at the entire expense of food and fodder crops and without regard to rotations. There is no doubt that the high prices did tempt the farmer to grow a larger area than was safe and in consequence he has suffered not only from a shortage of food and fodder, but also from the increased cost of labour following this food shortage. Further by neglecting rotations, he has not only impoverished his land, but has been unable to give this the cultivation necessary to keep weeds in check. For example, in the Tinnevely tract the cotton crop is sown in September-October, and remains on the ground till the beginning of August, when the plants are pulled out. August is usually a rainless month and it is not possible to cultivate the land then, and the result has been that where cotton has followed cotton, the only cultivation between two crops has been the ploughing given with the first sowing rains, which rather encourage weeds to grow than check them.

If then Madras has been dependent on Indian cottons alone, the extension of cultivation would have been very definitely fixed, and for the reasons given above any extension in area under this crop would be largely counterbalanced by a decrease in acre yield. Madras, however, had another string to her bow in the shape of Cambodia cotton. This is a species of cotton which was introduced some 15 years ago from Cambodia. The history of this cotton and its vicissitudes are interesting, and have a very important bearing on the future of the whole cotton in Madras.

When seed of this was first obtained by the Agricultural Department, it was grown for trial on black-cotton soil. Very little work up to that time had been done on the cotton crop and it was not then realized that this cotton was entirely different to the country cotton both in habit and in its requirements in the way of soil, rainfall, and soil fertilities, etc. Early trials therefore were not particularly successful, and it was only when this was grown under irrigation from wells that its possibilities were recognized. The fame of this cotton and tales of the enormous acre yields obtained spread rapidly, and soon seed was available in all the Southern districts. Its fame, however, spread much more rapidly than did the knowledge of the requirements of this crop and the result was that there was at first a very large extension of the area under Cambodia cotton which again dwindled down as rapidly as it rose. The first zenith of this crop was about 1911 to 1912 and at this time it was grown on all

descriptions of soils, on garden lands under wells, on wet lands, on black cotton soils and on red soils. Its cultivation on garden lands was soon given up except in the Coimbatore district. Farmers had made much money out of this crop, but at the expense of their soil fertility and of their grain and fodder crops. This money was very largely sunk in making new wells and in deepening existing wells. It was only in Coimbatore that the garden land farmer realized the possibilities of this crop and worked it into his rotation. Here however the standard of farming is very high and much greater attention is paid to maintaining the fertility of the land.

In wet lands irrigated from tanks, this crop, though at first it replaced paddy, was subsequently only grown when the water-supply was insufficient for a paddy crop. The crop however persisted as a rainfed crop in the red soil areas especially in the deep red soils near the foot of the hills and also on precarious soils in other places, *i.e.*, on such soils where the return from the land was in any case bound to be small. The reason for this is to be found in the habit of the plant. The Cambodia cotton is an entirely different species to the Indian cottons. The latter are essentially deep rooted crops and the tap root penetrates deeply into the soil. The Cambodia cotton on the other hand is shallow rooted crop and is largely a surface feeder. Hence it soon exhausts the surface soil fertility and is much more dependent on a well distributed rainfall than country cotton. A fall of rain which penetrates, say 6 inches into the ground, will immediately cause the Cambodia plant to put on vigorous fresh growth while such a rain has very little effect on a black-cotton soil cotton except to cause the bolls to shed owing to the moisture at the surface causing the cracks in the soil to fill up and thus check soil aeration. It can readily be understood that unless subsequent showers are received, the Cambodia plant soon begins to flag and cannot maintain the rate of growth which it made when rain was received. A subsequent rain may or may not come. If it does it may enable the plant to yield its cotton. If not, the plant will merely keep alive till it rains again. It is this power of being able to temporarily recover after a shower of rain which makes this cotton such a dangerous element in the improvement of Madras cotton, when this crop is grown without the aid of irrigation.

All cottons are naturally perennial plants but all black-cotton soil varieties are invariably treated as annuals. The Cambodia however by holding out hopes of a crop—like dangling a carrot in front of a donkey's nose—has induced people to keep this on as a perennial and it is no uncommon thing to find

Cambodia crops which are two, three and even four years old. This has just suited the inclinations of many farmers. Here is a crop which once sown, will last for three-four years, it requires no labour except to pick the cotton and with a lucky season and high prices, may bring in a very profitable return. This explains why there are such large areas of these old cotton crops. In the deep red soils near the foot of the hills, which are highly malarious and where labour is usually scarce, large areas of such old crops are to be seen. In the Kallar country of Madura again there are large areas grown because the people are not farmers but have the land and have found a means of obtaining an income from it with the minimum expenditure of labour. In the shallow dry soils of South Coimbatore very extensive areas of such cotton were to be seen and those were grown and left because the seasons in this tract are precarious and such crops are likely to pay as well as any other. This then was the state of Cambodia cotton from 1912—13 to 1916—17. With the gradual rise in price which was taking place at that time the farmer naturally wished to benefit by this and used every means in his power to increase his area under cotton. Once again the Cambodia cotton became a common crop on garden, dry and wet lands throughout the Southern districts and with the continual rise in prices, which, in 1918, touched over a rupee a lb., it was natural that the farmer should strive to win every ounce of cotton which he could and even on good garden lands, crops were retained throughout the year until the season was passed for sowing anything else. Thus, even on the richest garden lands there were large areas of 2 year old cotton standing. 1918-19 stands out as the largest area under Cambodia cotton yet grown in the Presidency and it was estimated that some $3\frac{1}{2}$ per cent of the total yield of cotton in the Presidency, was represented by Cambodia. This estimate, however, has not been fulfilled and the reason is not far to seek.

Now these methods of cultivation, though they may be reprehended as not utilizing the land to its full capacity, may have been justifiable in the eyes of the farmer who naturally had his own pocket to consider. He saw an opportunity of making great profit from this cotton and naturally was not slow in doing what he could to reap the full benefit of these high prices. This outrage against all the recognized principles of agriculture, this neglect of cultivation, of rotations, of weeding and of plant sanitation has brought about results which might have been expected. Such crops alternately flushing with a shower of rain and flagging for want of rain offer conditions most favourable to the attack of insect pests and disease. The plant is there all the time and insects which feed on the crop, have every

opportunity to breed and multiply and the same applies to fungus disease. The damage does not end here, however, such diseases do not remain on these old crops alone; but also spread to newly planted crops both of Cambodia cotton and of country cotton. It is very difficult to estimate the extent of damage done by such diseases. These not only weaken the plant but at times kill it out-right. Such loss is very considerable but is very difficult to estimate. Such diseases as however attack the boll can, to a certain extent, be estimated by the damage done to the cotton which is picked and sold. This can be reckoned by the decreased sale price of such cotton. In the Tinnevely tract one of the buying firms has estimated this loss at at least Rs. 25 a bale. Forty thousand bales at Rs. 25 means a crore of rupees and this, I consider, a very conservative estimate. This however is only a fraction of the loss caused, because, if the insect or fungus attacks a vital part of the green boll, this will either wither on the plant or will drop to the ground before it has fully developed. Some idea of this damage can be gained by the Director of Agriculture's forecast for the 1918-19 crop. This was estimated, in the case of Cambodia, at 242,600 bales, and deliveries at presses and mills up to date, i.e., from 1st February to date, amount only to 146,970. It is true that more is yet to be delivered as many ryots who reaped the advantages of high prices in 1918, can afford to hold up this crop and have done so in the expectation of the price again reaching the high figures of 1918, but nothing like 40 per cent (valued at about 26 crores) of the total crop. I may here mention that these outturn reports are based on all available information and until this year have furnished a very dependable forecast.

That such diseases were causing a serious loss to the grower first forcibly came to prominence in the summer of 1918 when the second pickings were found to be seriously damaged chiefly by insect attack, but the real seriousness of the situation was only realized when the 1919 crop commenced to come in. The early deliveries of cotton at the Tiruppur market which were the pickings from two to four year old crops showed an appalling state of affairs. The cotton was of a dull grey colour and was badly stained either dark red or bright yellow. A large proportion of the fibre was 'dead', i.e., it had been killed in the green boll before it was fully developed. It was impossible to gin such kappas properly as it contained so much worm eaten, and unfilled seed, that this was dragged between the roller and the knife and passed through with the lint.

The bulk of this damage was primarily due to the grub of a small moth known as the *pink boll worm*

and it was at once evident to those who know the life history of this insect that the position of Cambodia cotton as a staple cotton was bad and likely to get very much worse before the season was over. This damage was not confined to Tiruppur, but was to be seen in all the cotton markets of the south, and what is a still more serious point is that the attack was not confined to Cambodia cotton only, but had spread to the local Indian cottons.

The life cycle of this insect during the growing season is completed within about fourteen days. The female moth lays some five hundred eggs; these are laid singly either on the young boll or in the cotton flower and hatch out almost at once. As soon as they hatch, they bore into the ovary (*i.e.*, the undeveloped boll) and here they commence to feed on the tender seed. Within a few days they are full grown and bore their way out through the side of the boll and usually pupate or form a chrysalis under the protecting leaves which cover the base of the boll. From this the moth emerges and immediately commences to repeat the life cycle. Thus, not allowing for casualties, one female moth within fourteen days produces some 250 female moths, and each of these within fourteen days produces 250 female moths. It does not need any great power of arithmetic to reckon how rapidly such an insect can multiply during a period of five months when the cotton plant is in boll. In fact it is a matter of surprise that any bolls escape. Careful examination in the field at different times during the bolling season was made last year by the Government Entomologist and from 60—80 per cent of the bolls were damaged. Many of them contained several boll worms.

The damage done by this insect has thus last year run into crores of rupees and may be summarised as follows:—

- (1) Large numbers of young bolls drop to the ground because the grub has damaged some vital part of the boll.
- (2) Attacked bolls usually open prematurely and any undamaged fibre is very weak as it is not fully mature.
- (3) The excreta of the grub dirties the cotton.
- (4) The cotton fibre is stained a dark red.
- (5) The holes made in the green boll when the insect emerges lets in moulds which feed on the cotton fibre thereby weakening it and at the same time covering the fibre with black spores which give the ginned cotton a dull grey colour.
- (6) The seed in prematurely opened bolls is soft and full of moisture, and when such

kappas is stored, it heats and deteriorates greatly both in colour and in strength.

One of the worst features of this attack is the unfair distribution of the damage done. The disease was fostered by the thousands of acres of 2—4 year old crops, *i.e.*, by careless, lazy and bad farming practice. Those farmers who really farmed their lands well and who had invested a considerable out-lay of time, money and labour in growing this crop systematically and carefully, were the greatest sufferers as the insect did not confine its attacks to 2—4 year old crops, but migrated to the crops sown that year as soon as they came to flower and young boll. The 60—80 per cent of damaged bolls referred to above referred to well grown crops of that season's sowing.

In 1918 when the damages caused by this pest first began to show how serious the damage was, officers of the Agricultural Department consulted many ryots of the Coimbatore District. It was generally admitted that these 2—4 year old crops were the cause of the spread of the pest and that they were a serious menace to the future of Cambodia cotton. Many such farmers whose belief in the powers of the district administration still savours of a period of half a century ago, expressed the opinion that the Collector should issue orders that the old crop should be pulled out, and they were unable to realize that the Collector had not power to do so. This opinion is sound. It means that if the crop is pulled out by a certain time the moth of the boll worm has nowhere to lay its eggs and the pest, to a great extent, dies out. Further, this method has been tested in other countries more especially in Egypt and has been attended with very considerable success.

Since that time however the Pest Act has become law and the Agricultural Department recommended to Government that it should be enforced in the Coimbatore district for the eradication of all old crops of Cambodia. Cambodia cotton alone was specified because Indian cottons grown on black-cotton soil are always pulled out at about this season. The time fixed for the eradication was the 1st August, by which time the second or summer picking was practically completed. Its scope was limited to the Coimbatore district, excluding the upland plateau of Kollegal, as it was considered that experience should be gained in working the Act thoroughly in a limited area rather than covering the whole Cambodia tract of the south where control of the work could not be efficiently supervised. The work was carried out by the revenue and village officers and with the assistance of officers of the Agricultural Department. The work of the latter was

largely educative. Tahsildars, who were appointed appellate officers under the Act, and revenue inspectors and village officers, who were appointed inspecting officers, had all to be taught something of entomology and the life history of this particular pest. The damage done to the crop had to be shown to them as well as the living specimens of this grub. Farmers in the villages had to be met and the reasons why the crop had to be pulled up, explained to them. Very few of them realized why Government had enforced the Act. Some thought that Government did not want them to grow cotton. Others again thought it was merely a means to increase the area under food-grains. In one village the people thought that it was done as a prophylactic against influenza. Very few of them realized also what damage was being done to their crops. None had ever thought of opening the green bolls on the plants and were dismayed when they discovered that nearly every boll was riddled by this grub. When once the farmer realized the extent of the damage done, there was no difficulty in getting the crops pulled out. In fact very many of them appreciated the measures taken and realized that the eradication was done solely in their future interests. This was specially the case in the well farmed garden lands of the district. Where the standard of agriculture was highest the necessity for the measures taken were most appreciated and vice versa.

Certainly many farmers incurred a temporary loss, but this was not so great as was imagined. As already explained the better quality of cotton and the highest acre yields are obtained by sowing annually. The seed is sown in September-October and picking commences in April. The main season picking is completed in May. After a short rest the plant sends out secondary shoots which give a second or summer picking in June-July after which the plants are pulled out to make room for other crops, usually either ragi or cholam. Where agricultural practice is backward and the Cambodia crop is treated as a perennial, a two or three year old crop will give a picking in January-February. If rains are favourable, it may give another picking in May, and again another picking in August-September, but as practically every boll on such crops was damaged by the boll worm, the yields are only small and the quality is so bad that it is difficult to dispose of the crop. The experience gained in working the Act during this past season will allow of considerable expansion of the work in the future and it will, this next season, be possible to extend the area to the adjoining districts, and, within two years, it is hoped, that it will be possible to deal with the whole Cambodia area of the southern districts. Since the work last season was confined only to the Coimbatore district,

the full effects of the measures taken this year may not be apparent as there is nothing to prevent this pest from coming in from Salem, Trichinopoly and Madura districts, where there are still large areas of old crop still standing.

There is no doubt whatever that the cultivation of Cambodia cotton on the lines on which it has been allowed to develop was leading to a time at no very distant date when the crop would have become extinct and since the damage was extending also to the local cottons there is no doubt that these would also suffer, not to the same extent perhaps, but sufficient to reduce very considerably not only the acre yield but the price.

In no other country in the world is cotton of the same species as Cambodia, treated other than as an annual crop, and its future in Madras depends on its being treated from now onwards as such. When it is treated as such there is an immense future before it. On garden lands a good crop will yield more than a bale per acre of cotton, and it requires less irrigation than any other garden crop. It not only means that it will be a source of much profit to the farmer, but it also means, if this cotton is produced in sufficient quantity and can maintain its quality, that India will become much less dependent on foreign countries for the supply of better qualities of yarn and cloth.

THE PAPER INDUSTRY IN JAPAN.

The Journal of the Royal Society of Arts says:—

The manufacture of paper has been carried on in Japan for many centuries. The product now generally known as Japanese paper was described by the early Dutch traders nearly 250 years ago. This product has served all the uses to which we put paper—book printing, covering for doors and partitions, writing and wrapping—and, in addition, has been utilised by the Japanese as a substitute for string, cloth, oilcloth, leather, and even wood, iron and glass. Its excellent lasting qualities and its superiority over machine-made papers have led to its utilization for a number of purposes for which foreign paper would be unsuitable. These advantages are due to the fact that in making this paper the Japanese use the tough and pliant inner bark from three or four species of deciduous trees, possessing long, tough, fibre cells, and this bark is not cut or hacked in transforming it into pulp, but is separated by pounding and beating, so that the long cells remain unbroken.

In the manufacture of this paper the form is held so that the parallel splinters or threads run from left to right. The form is then lifted and lowered at right angles to this direction, causing the fibres of the material to lie in one direction. Japanese paper is consequently torn easily one way, but with difficulty the other. There is no special sizing or glazing, but each sheet has a rough and smooth side, resulting from the process of drying. The shaped sheets are pasted with a large brush on a smooth planed board to dry, and the side against the board remains much smoother than the outside surface. The smooth side is used for book printing and the two rough sides are folded against each other in binding the book, so that Japanese books consist of double sheets of thin paper.

From an interesting monograph on the paper industry in Japan, prepared by the Far Eastern Division of the U.S. Bureau of Foreign and Domestic Commerce, and from which the foregoing particulars have been taken, it would appear that all Japanese paper is very porous, and consequently cannot be written on with pen and ink, although it is well adapted to the Japanese mode of writing with brush and India ink. Smooth, firm, machine-made paper would not absorb this ink so well, and is therefore not in demand. There is no bleaching, and all Japanese paper is of a yellow tint, although sometimes whitened by the ingredients used to soften it in manufacture.

Paper produced in Japan may be divided into two general kinds—Japanese paper as described above, and foreign or machine-made paper. Aside from the nature of the product, the two industries are further distinguished by the fact that the former is largely a household industry, and the latter a factory industry. The production of the Japanese paper in 1916 is officially valued at over £2,500,000; no figures as to quantity are available.

The principal raw materials entering into the manufacture of Japanese paper are the inner barks of the paper mulberry trees (*Broussonetia papyrifera*, *Edgeworthia papyrifera*, *Wickstroemia canescens*—a small bush related to the spurge laurel, *Morus alba*—white mulberry tree) and the *Aphananthe aspera*. The classes of paper produced from these materials are broussonetia papers, made from kodzu fibre; edgeworthia papers, made from mitsu-mata and from a mixture of mitsu-mata and kodzu; wickstroemia papers, made from the best of *Morus alba*; and suki-gaeshi papers, made from old or used papers.

The names of the various kinds of paper of each class, the province where made, the size of the sheets, and the number of sheets and the weight per quire, are given on p. 227.

Japanese papers derive their names almost exclusively from the towns or districts where they were originally made, and this geographical distinction perhaps accounts to some extent for the difference in grades. A short description of each of those figuring in the export trade is given below:—

Yoshino, manufactured in the town of Yoshino, in Yamato Prefecture, is a fine paper, used extensively in the lacquer industry. The mould is a net made of finely wrought bamboo sticks bound together with silk thread, and the texture of the product is indicated by the figures in the following table, one quire (50 sheets), or about 6.12 square metres, weighing only 35 grammes. The paper is so firm, however, that two or three layers used to filter thick lacquer are not only uninjured by the wringing and pressing through of the lacquer, but are afterwards smoothed out, dried, and used several times over for the same purpose.

Tengujo, literally "prize-crowned-labour," excels in fineness and pliancy the thinnest silk papers, and is also much stronger. It is manufactured in Mino Province, and is extremely well adapted for pasting on common window panes to make them opaque.

Mino is pure broussonetia paper made in the Province of Mino, and is noted for its firmness. It is used for covering woodenwares in the process of lacquering, for cord, and as a covering for the lattice of sliding doors, as it is very transparent. The 1916 production was 275,293 reams.

Hanshi, literally "half-paper," is so-called because of its common use in book manufacture, where only half the sheet is used, the rough surface being turned in. Its widest uses are for writing, printing, and paper handkerchiefs. Production in 1916 amounted to 32,66,195 reams of 100 quires (6.12 square metres) each.

Usuyo, or gampi, is at present used largely abroad as a copying paper in business houses, although its pliancy, smoothness, strength, and lightness will probably find other uses for it, as it becomes better known.

Torinoko is a semi-foreign paper which resembles parchment, and has enjoyed an increased sale abroad, especially in China, as a substitute for foreign parchments.

Renshi, literally "ream paper," is an imitation of the Chinese-sized papers put up in the same quantity, and is sold almost entirely in China.

Toyoshi, "Far East paper," is also sold almost exclusively to China, where it is used for a variety of local purposes.

Other varieties of Japanese paper, which do not figure in the export trade, but which are used largely in Japan, include the following:—Hankiri, resembling hanshi, used for account keeping and letter

writing; nishi-no-uchi and shi-fu-gami, made from broussonetia bark in very large sheets, are exceedingly strong, and are used as a fabric; atsu-gami and senka are very thick strong papers used in making imitation leather and oil papers; another heavy, starched paper, ko-sugi, is cheaper, and is used for cleansing purposes; iyo-masa is a soft paper, and is well adapted for wrapping dried plants; hosho, one of the most valuable and expensive Japanese papers, is thick, very strong, of even texture and gloss, rich in starch, and often contains alum. It is used as the Government paper for all important legal acts, as a wrapping paper for expensive presents, and was formerly used for making paper-money. It is made in the celebrated five villages of Hoshi district in Echizen Prefecture.

Ju-mon-ji and jidzuki, otaki-gami, are large sheets of very thick, stout paper, used principally in the preparation of leather paper,

Suruga-ban-shi is a thin writing paper, and is also used for cleansing purposes and printing.

Shoji-gami contains about 20 per cent of Edgeworthia pulp, and serves principally as the covering for lattices or shoji (sliding doors) and as a substitute for window-panes.

Ita-me-gami, or board paper, is made by fastening together, with wheat-starch paste, a number of sheets of common paper. This pasteboard is frequently made from waste paper, old business documents, and other used paper, covered with a coating of fresh paper of good grade.

Papier-Mache.—Hari-nuki, or Japanese papier-mache, is also prepared from waste paper, but the process differs in that the hari-nuki is not prepared from paper reduced to pulp after being soaked in water, as is papier-mache, but is made like pasteboard, the couching being done on wooden forms.

Name of Paper				Province where made		Size of Sheets	Sheets per quire	Weight per quire
						Centimetres.	Number.	Grammes.
Broussonetia Papers:—								
Yoshino-gami	...	...	...	Yamato	...	48×25·5	50	35
Mogami-gami	...	...	...	Uzen	...	31×27·5	50	25
Tengu-jo	Pure	...	...	Mino	...	39×27	48	56
	Figured	...	...	Do.	...	39×27	48	...
Mino-gami	...	...	...	Do.	...	40×28	50	137
Mon-shi	...	...	...	Do.	...	40·5×28	50	125
Han-shi	...	...	...	Tosa	...	32×24·5	40	67
Ko-ban-shi	...	...	...	Musaski	...	26×20	50	87
Hankire	...	...	...	Koshiu	...	52×39	50	200
Nisho-no-uchi	...	...	...	Do.	...	47·5×35·5	50	254
Shi-fu-gami	...	...	...	Iwaki	...	53·5×41	50	256
Atsu-gami, okiban	...	...	...	Koshiu	...	44×33·5	20	240
Atsu-gami, koban	...	...	...	do.	...	42×29·5	20	200
Senka	...	...	...	Echigo	...	56×39	20	250
Do.	...	...	...	Iyo	...	44×32	20	220
Ko-sugi	...	...	...	Tosa	...	25×19·4	48	72
Iyo-masa	...	...	...	Iyo	...	52×39	48	372
Hosho	...	...	...	Echizen	...	57×44	48	852

Names of Paper				Prouince where made	Size of Sheets	Sheets per quite	Weight per quire
Jidzuki-Otaka-gami	...	...	...	Musashi	60×42	20	600
Otaka-gami or Jumon-ji	...	...	...	Iwaki	66×46	20	800
Edgeworthia Papers :							
From Mitsu-mata only—							
Suruga-banshi	...	...	...	Suruga	62×48	50	250
Hankire	...	...	...	Koshiu	55×16	50	84
Nori-ire...	...	...	...	do.	43·5×32	50	237·5
Mixture of Kodzu and Mitsu-mata bast pulp—							
Hanshi	...	...	...	do.	34×24	50	75
Shoji-gami	...	...	...	do.	40·5×27·7	50	135
Take-naga-gami	...	...	...	do.	67×26	50	325
Hosho	...	...	...	do.	47×34·5	50	375
Wickstroemia Papers :							
Gampi-shi, first quality	...	...	...	Mino	38×28	48	52
Usego, uncut gampi	...	...	...	do.	50×36	48	96
Kuva-kami Paper :							
First quality	...	...	...	Koshiu	48×34·5	20	135
Second quality	...	...	...	do.	41×27·5	50	164
Suki-gae-shi Papers :							
Chiri-gami, grey	...	...	...	Musashi	40×26·5	50	150
Suka-gae-shi, best quality, grey-white	...	...	...	do.	31·5×26·5	50	75

Sheet after sheet of light waste paper is stuck with wheat-starch paste, and spread out over the form until the required thickness is obtained. The board is then cut, dried, and lacquered, and many small durable articles are made from it, such as dolls' heads, plates, saucers, tea caddies, and pipe cases. These articles closely resemble lacquered wood and far excel papier mache in firmness and elegance. They are strong, durable, and surprisingly light and cheap. Kara-kami, or paper for hanging, is made in sheet size in a very small quantity, owing to the light demand.

Crepe Paper.—By means of two very simple wooden tools—a lever press and mould—the smooth surface of several bark papers is twilled, and stiff cardboard is made soft and pliant, and given a surprising elasticity. The lever press is made either of evergreen oak or some other hardwood, and stands,

on a foundation consisting of a large, heavy board, through which two perforated posts are fastened as tenon bearers, and between which lies the fulcrum of the lever. The moulds are large sheets of thick brown paper, which are grooved in parallel furrows in several directions, and show considerable elasticity when moistened. The paper to be twilled is wrapped around a wooden cylinder, varying in diameter from 2 to 3 inches, and in length according to the size of the paper, which also determines the height to which the tenon for the fulcrum of the lever is raised.

The sheets are moistened by sprinkling, and subjected for an hour to a mild-pressure between alternate layers of wet paste-boards. The moistened sheets are then placed on top. In this arrangement of layers the single sheets must lie even with the separating sheets, and have their edges parallel to

those of the moulds. These layers are wrapped tightly around the cylinder, making it about 6 or 8 inches in diameter. The cylinder is then diagonally wound round with a strip of hemp canvas and placed in the press, where pressure is applied by six or eight jerks on the roll, which is compressed in the direction of its axis. It is then taken out, and the thin sheets removed and placed on the forms or moulds in another position. After this process has been repeated eight or ten times in different positions, the paper is considerably smaller in length and width, but is stretched somewhat before being used. With each new operation the markings from the moulds become constantly finer and more regular, and shrinkage of the sheets and increasing softness and pliancy accompany this transformation.

Leather Paper.—Japanese leather paper is very soft, has great elasticity, and resembles calf leather. It is used in the manufacture of leather portfolios, tobacco bags, pipe cases, boxes, small chests, and other articles, and also as a floor covering, and as a protection from rain over wooden shoes. The paper is admirably adapted for hanging in salons. The process of manufacture is briefly as follows:—

1. The paper to be treated is spread out on a board, the smooth side up, coated with thin rice paste, to which lamp-black has been added, and then hung on horizontal poles to dry for several days.

2. The twilling is done by the same process employed in making crepe paper.

3. A coating of perilla-seed oil is applied, and it is allowed to dry in the sun from five to twenty days, according to the time of the year.

4. A coating of paste solution mixed with the dye to be used, generally red oxide of iron, orpiment, indigo, india ink or other dyes, is put on.

5. When dried the paper is impregnated with lacquer by two workmen sitting opposite each other, who smear their hands with lacquer and beat them quickly on the sheet, after which it is dried on a frame.

6. If the leather paper is to be figured, carved wooden moulds are pressed in at the close of the crepe process, and the colours applied by paper stencil plates. A metallic reflecting surface is obtained after the figures are made by fixing bronze powder with lacquer, and polishing when dry. Some papers are dried in the smoke of rice straw and then rubbed.

Paper Fabric—The warp of Japanese paper fabric consists of silk threads and the woof of paper threads, made of broussonetia fibre. To make these threads, the paper is laid lengthwise over the narrow

side of a thick board, provided with feet to lend it stability, and fastened at both ends with iron clamps. It is then cut into strips, long ribbons being produced by cutting the paper not quite to the end. These are rolled into thread on a stone slab by hand. The connecting edges are cut on both sides so far through that the single threads hang together by a width of only $\frac{1}{4}$ inch, and these connecting places are twisted to form a continuous thread.

In making paper fabric for clothing, the threads are twisted from right to left, like those of the silk woof for crepe silk, and run in the fabric alternately, two right-twisted woof threads following two left-twisted ones. When finished the fabric is washed in boiling straw-ash lye, dried, and stretched. It acquires in this process an appearance of being twilled and is shrunk considerably. It is then dyed in various patterns. 150 years ago this fabric was very popular in Japan for women's summer clothing, but the more durable cotton fabrics have supplanted it at a much lower price, and now only a few small factories engage in the industry.

Oil Paper and Waterproof Paper.—Oiled papers are made for two purposes in Japan, one for use as transparent paper in lanterns, etc., and another for protection against water, as for umbrellas, and regular oil and leather paper. For this product perilla-seed oil is invariably used, and broussonetia paper of a stout grade is generally employed. The paper is made pliant, either by a kneading, or by the crepe process already described, and is pasted in the thickness desired with glue or paste made from the flour of the common brake. The sheets are then treated with a mixture of lamp-black (for black waterproof cloaks) and the juice of unripe persimmons, and dried in the sun for five days. Two coats of perilla-seed oil boiled with persimmon juice are then applied, drying taking place between the applications. The entire process requires about 15 days in good weather. Though far inferior in appearance and durability to oilcloth and western waterproof cloth, oil paper has served its purpose in Japan for several hundred years.

Since the oiled Japanese paper umbrella could not be used as a sunshade, nor the unoiled variety as a protection from the rain, the adoption of the silk umbrella, suitable for all weathers, has been rapid, and the Japanese manufactured silk umbrella is one of the few foreign articles used generally throughout the interior as well as in the large cities.

Foreign and Machine-made Paper.—The total production of European, foreign or machine-made paper in Japan in 1916 amounted to 558,588,246 lb., as compared with 197,506,826 lb. in 1907. The paper produced in 1916 was made in 51 modern

mills, representing a total capital of more than £3,000,000. There has been a steady increase in production in recent years, as a result of which the imports of every variety of paper have decreased considerably, and there is reason to believe that the industry is firmly enough established in Japan to withstand any foreign competition. This is especially true of those kinds of paper, the output of which is on a large scale, and in the manufacture of which the Japanese are organizing for scale production by concentrating the industry on modern lines in the hands of one or two large companies.

NEW SOURCE OF TURPENTINE AND ROSIN IN INDIA.

The following article appears in the current number of the *Bulletin of the Imperial Institute* (London):—

In a previous number of the *Bulletin* (1915, 13, 351) an account was given of the results of investigation at the Imperial Institute of the turpentine oil and rosin obtained by the distillation of the gum-oleo-resin of *Boswellia serrata*. Since then further samples of these products, as well as samples of gum derived from the same source, have been examined, and their commercial value and uses investigated. An enquiry has also been carried out in India at the Forest Research Institute, Dehra Dun, and a report on the methods of tapping the trees, the preparation of the products, their chemistry, commercial value and industrial uses, is incorporated in a paper entitled "Note on the preparation of Turpentine, Rosin and Gum from *Boswellia serrata* (Roxb.) gum-oleo-resin," by R. S. Pearson, F.L.S., I.F.S., and Puran Singh, F.C.S., published in *Indian Forest Records* (1918, 6, 303). A summary of the information given in this paper, and the results of examination of the products at the Imperial Institute are given in the present article.

DESCRIPTION AND DISTRIBUTION OF TREE.

Boswellia serrata, Roxb., is a moderate-sized tree, belonging to the natural order Burseraceæ. A number of important resins are obtained from plants in this order, including African olibanum or frankincense, derived from *Boswellia carteri*, Birdw., and *B. Frereana*, Birdw., myrrh from *Balsamodendron* spp., bdelliums from *Commiphora* spp., manila elemi from *Canarium* spp., west Indian elemi from *Dacryodes hexandra*, Crieseb., and American elemi from *Bursera gummiifera* Linn.

According to some authors there are two forms of the tree, *B. serrata* proper, which occurs in the intermediate northern and southern dry zones, and *B. serrata* var. *glabra*, Hook f., a native of North-West India, which Roxburgh regards as a distinct species, under the name *B. glaber*.

Pearson and Puran Singh state that *B. serrata* is found from the Sutlej extending eastwards to Nepal on the outer slopes of the Umballa and Saharanpur Siwaliks. It is common throughout Rajputana, Bihar and Orissa, in the Circars, the Central Provinces, Khandesh, especially on the slopes of the Satpuras, in the Deccan and Carnatic, but it is not found in Assam. It is rare in Burma, but according to *Agricultural Ledger* (1900, No. 10, p. 101) it is said to attain a height of 100 to 120 ft. with a girth up to 10 ft. and over in the Pegu Forest Circle. Elsewhere in India it only attains a height of about 40 to 60 ft. with a girth of 3 to 5 ft. The tree is often the dominant plant on hot rocky hillsides, and is frequently the forerunner of better forests as soon as protection from fire and grazing is introduced.

Information has been collected from certain localities as to the number of trees available for tapping. From the figures given the tree appears to be most abundant in parts of the Central Provinces; in the Nagpur-Wardha Division there are approximately 9,000,000 available in the east Pench Range and 2,500,000 in the West Pench Range; whilst there are 5,000,000 in the Chandi Range, 3,500,000 in the Bûrhanpur Range and 1,250,000 in the Khandwa Range of the Nimar Division. The Conservator of Forests, Berar Circle, however, expresses the opinion that the last three estimates are high and should be treated with caution. In the North, East and West Khandesh Divisions of the Bombay Presidency also there are large numbers of the tree. The total number available for tapping in selected areas of these three divisions amounts to nearly 12,000,000, of which more than half occur in the Shirpur Range of North Khandesh.

METHODS OF TAPPING.

Difficulty having been experienced in ascertaining the best method of tapping *B. serrata*, experiments were undertaken in widely separated districts.

In the Nimar Division, Central Provinces, 1,023 trees were tapped from January 21 to February 23, the average yield of gum-resin per tree being as follows:—

Girth of tree.	Average yield oz.
24 to 30 in. ...	... 0·9
30 to 36 in. ...	... 1·3
26 in. and over ...	... 1·8

In the areas tapped there were eight trees per acre with a girth of 24 to 30 in., seven trees 30 to 36 in. and eight trees 36 in. and over. For a working season of five months, the yield per acre would be:—

Girth of tree		Yield per acre.
		lb.
24 to 30 in. ...	...	2'27
30 to 36 in. ...	...	2'95
36 in. and over ...	...	3'58
Total ...		8'80

The trees were tapped by shaving off a girdle of bark one foot broad to a depth of about half the thickness of the bark, and "freshing" at definite intervals. It was found that the gum-resin should be collected and the cuts "freshed" at least every fourth day to obtain the highest yield of gum-resin. As a general rule, old trees with black bark, dwarfed and suppressed trees, and trees with a short boll, yielded no gum-resin, whilst this was the case also with a large number of healthy trees of small girth. On the other hand all sound and vigorous trees of 30 in. girth and over, all trees attacked by borers or otherwise diseased, and generally all hollow trees, yielded well.

Further experiments conducted during the rainy season in Nimar gave better results as regards yield than those referred to above, which were obtained

during the dry season. The average yields of gum resin per tree in the later experiments were 5'0 oz. in July and 7'6 oz. from other trees tapped in August. In this case, however, the gum-resin had absorbed water from the rain, which rendered it difficult to deal with subsequently in the solvent still, where the gum is separated from the rosin and turpentine.

Two series of tapping experiments were carried out in the North Khandesh Division of the Bombay Presidency. The method of tapping adopted was to remove a band of bark one foot broad all round the trunk, and nearly as deep as the cambium, at a height of 3 ft. 6 in. from the ground. The gum-resin was collected and the tapping wounds "freshed" every five days.

Ninety trees 24 in. in girth and over produced, as the result of nine collections, a total average yield of 1'07 oz. per tree, during the months of June and July. Another series of experiments with ninety trees was conducted over a period of seven months (December to June). In this case the "freshing" consisted of removing a thin layer of bark from the upper half of the cut and a further $\frac{1}{2}$ in. or so of bark from above the old wound. In forty-five of the trees the bark was bruised above the "freshed" wounds, but it was found that this reduced the yield enormously. The following yields of gum-resin were obtained from the unbruised trees:—

Girth	Number of trees	December 1916	January 1917	February 1917	March 1917	April 1917	May 1917	June 1917	Total	Average per tree
		oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.
24 to 30 in.	15	33'6	30'0	50'4	67'6	46'4	41'2	5'6	274'8	18'3
30 to 36 in.	15	38'4	64'0	63'2	57'6	69'6	53'6	15'2	361'6	24'1
Above 36 in.	15	129'6	138'0	171'2	209'6	140'4	169'2	21'6	679'6	65'3
Total ...	...	201'6	232'0	284'8	334'8	256'0	264'4	42'4	1,316'0	35'9

The above results show that the largest trees give the greatest yield of gum-resin and that the flow increases up to a certain point as tapping is continued. The flow reached its maximum at about the twentieth time of "freshing."

The low yields obtained in June in both series of experiments in North Khandesh are attributed to the fact that the rainy season commences in that month. Further drawbacks to the industry being carried on during the rainy season are the difficulty of moving about the forests at that period, and the

lack of labour in the forests owing to the high wages paid for agricultural work at that time of year. It was noticed in the North Khandesh experiments that trees with thick bark yield more gum-resin than those with thin bark, whilst large trees yield much more per square inch of wound surface than small trees, and it is doubtful whether it will pay to tap the latter.

Tapping operations have been carried out for generations by the villagers in the Sheopur Range

in the Gwalior State, and the results prove conclusively that the tapping of *B. serrata* can be carried out successfully on a commercial scale. It is estimated that the natives, who work generally in pairs, can collect ten to twelve maunds (823 to 987 lb.) per pair per season. The method of tapping is to make a preliminary blaze about 4 in. wide and about 4 feet from the ground, towards the end of the rainy season. About a month later the wound is "freshed" by cutting off a thin shaving of bark all round the stem, over half the depth of the old blaze, and taking in 2 in. of new bark on the upper edge of the original wound. A similar "freshing," is made at intervals of about a week until the end of March, when collection stops. The yield of gum-resin from the first "freshing," is small, but it increases until the fourth "freshing," after which it is said to remain practically constant. No very definite information was obtained as to the yield per tree by this method of tapping, but twenty average trees which had been once "freshed" gave a total yield of 10 oz., and twenty others which had been twice "freshed" gave 28 oz., whilst two abnormal trees, twice "freshed," yielded 22 oz.

As regards the effect of tapping on the trees it was found that out of the 1,023 trees tapped in the Nimar experiments, 993 had, for all intents and purposes, completely recovered when they were inspected. Three years after tapping had taken place ten trees were badly damaged, and twenty were dead, but all the latter were old, smothered with the parastic *Loranthus*, and severely attacked by insects. The most definite proof is available from Gwalior that no serious damage is done to the trees by tapping, provided that the operation is confined to a band 8 to 12 in. wide, and subsequently "freshed." In that locality, the trees had been tapped in this way year after year for generations, and not a single tree was found to have been killed.

From the experiments conducted in Nimar and Khandesh, and also from the corroborative evidence obtained from Gwalior, the following conclusions were drawn as to the best methods of tapping *B. serrata* gum-resin:—

- (a) The method of tapping should consist of shaving off a thin band of bark about 6 inch broad, 2 feet to 2 feet 6 inches from the base of the tree.
- (b) Tapping should generally be commenced in November, and should stop before the break of the monsoon.
- (c) "Freshing" should be undertaken every fourth or fifth day, and should consist in removing a thin shaving of $\frac{1}{2}$ inch to 1 inch of new bark from the upper edge of

the original belt, and carrying down the "freshing" to within an inch of the lower edge.

- (d) Tapping of trees below 30 inch in girth is not advocated.
- (e) Individual trees which yield little gum-resin after the initial tapping, and after the first "freshing," should be, excluded from the operations.
- (f) The effect of tapping on the trees need cause no serious apprehension.

Taking into consideration estimates given by various forest officers, the cost of collection of the gum-resin is considered to be probably about 5 rupees per maund (=about 9s. per cwt.) It is estimated that the total number of trees available for tapping in various localities would produce about 27,000,000 lb. of gum-resin per annum. This figure is based on the average yield per tree obtained in the North Khandesh experiments, and on the assumption that each would be tapped every third year,

COMPOSITION OF BOSWELLIA SERRATA GUM-RESIN.

From the results of analyses of eight samples collected by the Forest Officer at Khandesh during 1917, the average composition of the gum-resin may be taken to be as follows:—

	Per cent.
Moisture	10 to 11
Turpentine oil	8 to 9
Rosin	55 to 57
Gum	20 to 23
Insoluble matter	4 to 5

PREPARATION OF BOSWELLIA SERRATA TURPENTINE OIL, ROSIN AND GUM.

Messrs. Pearson and Puran Singh give a rough design of a plant proposed for the preparation of *Boswellia* products. The process is based on experiments conducted at the Forest Research Institute, Dehra Dun, but the plant is purely of an experimental nature, as certain factors remain to be determined owing to the tests having been made in an adapted still. The plant consists of a solvent extractor and a steam still, both fitted with condensers; two settling tanks; a solvent storage tank; turpentine, solvent, and resin receivers; and a tank for collecting the sludge.

Two methods of extraction are suggested:—

- (1) *Solvent extraction followed by steam distillation*—The solvents recommended are light petroleum (boiling point 80° to 110° C.) or trichlorethylene (boiling point 88° C.). The latter solvent possesses the advantage that it is non-inflammable and also that it is more readily expelled from the gum-resin, but it is not so easily recovered. The

solvent dissolves out all the constituents except the gum and woody impurities. After allowing impurities to settle out, the solvent solution is run into the still, and the solvent gradually distilled off with the help of the steam jacket. Steam is afterwards passed in, and the turpentine oil thus distilled off. The rosin can finally be run off in a molten state into barrels. The residual gum retains about an equal weight of solvent, the recovery of which is effected by treatment with superheated steam. This method possesses the disadvantage that the turpentine oil retains traces of the solvent which alters its constants.

(2) *Steam distillation following by solvent extraction*.—The turpentine oil is first distilled off the crude material by superheated steam at 120° to 130° B. By this method no water condensation takes place in the still, thus obviating the absorption of water by the gum. The residual mixture of gum and rosin is afterwards separated by treatment with the solvent as before. The advantages of this second method are that the turpentine is free from the solvent, and that the gum and rosin being in a dry state after the removal of the turpentine, are readily acted upon by the solvent.

COMMERCIAL VALUE OF SAME.

Two samples of turpentine oil prepared from the gum-resin of *Boswellia serrata* have been examined at the Imperial Institute. A summary of the results of examination of a sample received in 1914, is given below in comparison with those obtained in the case of a sample received in 1917.

The earlier sample consisted of rectified oil with a slight greenish-yellow tinge and a sweet agreeable odour. The second sample was a pale yellow oil, with an agreeable odour very similar to that of the previous one.

The two samples of oil were submitted to chemical examination at the Imperial Institute with the results shewn in the table below. The constants obtained in India in the case of a sample of re-distilled oil, from which the fraction of high boiling residue had been eliminated, prepared by steam distillation on a large scale at the Forest Research Institute, Dehra Dun, and the usual constants of commercial American and French turpentine oils are included for comparison.

.....	Results obtained at the Imperial Institute		Results obtained in India	Commercial turpentine oil	
	Sample No. 1.	Sample No. 2.	Re-distilled oil	American	French
Specific gravity at 15-15° C.	0·8446	0·8523	0·8371 (at 22° C.)	0·858 to 0·877	0·865 to 0·875
Optical rotation	+31° 24'	+25° 57'	+32° 30'	+9° 30' to +14° 17' (rarely slightly lævoro-rotatory.)	—29° to —33°
Acid value	...	...	...	...	...
Ester value before acetylation	2·6	3·0	...	...	...
Ester value after acetylation	36·4	54·3	...	...	...

The results of fractional distillation were as follows :—

Results obtained at the Imperial Institute.

Fraction boiling at—	Sample No. 1 per cent.	Sample No. 2 per cent.
153° to 160° C.	89	56
160° to 170° C.	11 a	24
170° to 180° C. and above.		20

a All between 160° and 180° C.

Results obtained in India

		Original oil per cent.
Below 160° C.	...	53·0
160° to 167° C.	...	17·5
167° to 180° C.	...	11·0
Above 180° C.	...	22·5
		Re-distilled oil per cent.
Below 155° C.	...	87
155° to 160° C.	...	8
Above 170° C.	...	5

In the case of sample No. 1 the fraction boiling at 153° to 160° C. was re-distilled and practically the whole passed over at 155° C.

For comparison with the above figures it may be stated that 85 per cent of American turpentine oil usually distills between 155° and 163° C., and 85 to 90 per cent of French oil between 155° and 165° C.

It was found that the Boswellia turpentine oil readily dissolved resins such as colophony, dammar, sandarac and soft copal, but varnishes prepared at the Imperial Institute in this way with both samples of oil were less lustrous and quicker in drying than varnish prepared with ordinary commercial turpentine under the same conditions.

The two samples of oil received at the Imperial Institute were submitted to various firms for technical trials and commercial valuation with the following results:—

Sample No. 1.—Specimens of this oil, which as already mentioned consisted of rectified oil, were submitted to several turpentine oil merchants and distillers, and to varnish manufacturers. The general opinion expressed was (1) that the oil is of very good quality and closely resembles American turpentine oil, except as regards the smell, which is regarded as peculiar though not unpleasant, and (2) that the Boswellia oil could be successfully employed like ordinary turpentine oil in the manufacture of varnishes.

All the firms consulted thought that the Boswellia oil would be readily saleable in the United Kingdom. One firm stated that its commercial value should be approximately equal to that of American turpentine oil though the difference in smell might constitute a slight drawback. Another firm considered that the oil would find a ready market in the United Kingdom if it could be sold at about 25 per cent under the price of American turpentine oil, and a third valued it at about 30s. per cwt., with American turpentine oil at 37s. per cwt.

Sample No. 2.—This was submitted to two firms of varnish manufacturers.

The first firm stated that they had prepared for comparison two varnishes, one with genuine American turpentine oil, and the other with the Boswellia turpentine oil, the remaining constituents in each case being the same, and had found that the Boswellia turpentine oil rendered the varnish slightly dull, whereas the varnish made with American turpentine oil remained bright. Equivalent quantities of Boswellia turpentine oil and American turpentine oil gave varnishes of different viscosity, that made with Boswellia turpentine being considerably thinner. The drying and "face" of the finished varnishes were however practically identical.

The firm considered that as a substitute for American turpentine oil the Boswellia oil would probably be placed between French or Spanish and Swedish or Russian turpentine but they were unable to assign a definite commercial value to it under present conditions.

The second firm reported as the result of practical trials that this turpentine oil has a tendency to accelerate the drying of varnishes, but that it detracts from their brilliancy and durability for exterior work. They stated that there is apparently no reason why Boswellia turpentine oil should not be utilized in the varnish trade.

Sample No. 2 contained a much larger percentage of the higher boiling constituents than the first sample, but nevertheless the varnish prepared with it dries rather quicker than that made with ordinary commercial turpentine oil. The inclusion of the higher-boiling fractions does not appear to have any adverse effect on the quality of the varnish, so that it would seem unnecessary to remove these fractions in preparing the Boswellia oil for commercial use. The best rule on this point would probably be to make the product agree in range of boiling point with commercial American turpentine.

Favourable results were also obtained in the case of samples of oil submitted for technical trial in India. One report stated that it is suitable for paint-making, paint prepared with it drying in under twenty-four hours, whilst another firm stated that as regards volatility the oil is excellent and better in this respect than any of the samples of the oil of *Pinus longifolia* prepared in India which had been submitted to them.

There seems to be little doubt that this Boswellia turpentine oil could be successfully utilized for varnish-making in place of ordinary turpentine oil, but it is not possible to state its exact commercial value until the product has been tried on a considerable scale.

Two samples of Boswellia rosin were examined at the Imperial Institute in 1914. A summary of the results is given below together with those obtained in an investigation of three further samples received in 1916 and 1917.

Sample No. 1 was prepared by steam-distillation, and consisted of dark brown, very brittle resin, with a vitreous fracture. The resin resembled colophony in odour, and was practically tasteless.

Sample No. 2 was obtained by heating the resin in a still over a gentle fire. It consisted of dark, greenish-black, very brittle resin, with a vitreous fracture. The resin had a slight "burnt" odour, but no taste.

Sample No. 3 was prepared in an extractor with light petroleum as a solvent. It consisted of golden-brown, brittle, transparent resin; its colour and appearance were approximately those of grade "G" colophony.

Sample No. 4 was described as "first instalment of Boswellia rosin, slightly frothy, made in copper," and consisted of dark brown, very brittle rosin with a vitreous fracture; in thin layers it was transparent.

Sample No. 5 was described as 'third instalment,

clear samples, fully heated though underboiled." It resembled sample No. 4 in every respect, except that in colour it was dark greenish-brown.

The results of the chemical examination of the five samples received at the Imperial Institute are shown in the following table, which includes for comparison the results obtained in India for two samples of Boswellia rosin prepared respectively with light petroleum and Boswellia turpentine as solvents:—

			Sample examined at the Imperial Institute					Samples examined in India	
			1	2	3	4	5	Prepared with light petroleum	Prepared with Boswellia turpentine
Moisture per cent	...	...	0.7	0.9	0.7	0.8	1.1	...	...
Ash per cent	...	...	0.5	0.4	0.03	0.3	0.2	...	...
Melting point: ...	...	...					
Rosin softens at	...	...	73° C.	56° C.	68° C.	71° C.	65° C.	...	...
Rosin melts at	...	...	...	...	...	78° C.	73° C.	...	...
Acid value	...	...	51.5	25.0	55.1	52.4	50.8	43.71	42.51
Saponification value	...	...	92.0	66.0	90.2	87.8	75.6	89.66	88.40
Iodine value per cent	...	...	70.0	96.0	...	64.6	76.2	97.10	98.20
Specific gravity	...	...	1.012	1.050	...	1.077	1.059	...	1.058
			(at 20/20° C.)	(at 20/20° C.)	...	(at 18/18° C.)	(at 18/18° C.)	...	...

It will be seen that the constants of Sample No. 2 differ from those of the other samples, and it would appear that this sample was abnormal.

The samples of rosin examined at the Imperial Institute were completely soluble in alcohol, ether, chloroform, benzene and turpentine oil, with the exception that Sample No. 2 was only partly soluble in alcohol.

8 Varnish trials made at the Imperial Institute with the rosin gave satisfactory results. In the case of Samples No. 4 and 5 the varnishes used consisted of 1 part of the rosin and 1 to 2 parts of turpentine oil. These varnishes, when applied to sized wood, dried rather slowly to a clear, bright, hard coat, which adhered firmly and did not crack. Varnishes prepared with 1 part of alcohol to 1 part of the rosins gave the same result.

Boswellia rosin was found to be not completely soluble in sodium carbonate solution, even on prolonged boiling, and it could not therefore be used as a substitute for colophony in making rosin soap or rosin size.

Enquiries were made by the Imperial Institute as to the commercial value of the rosin and samples were submitted to firms for technical trial. A firm of importers valued the rosin at about £20 per ton in London (July, 1916). A firm of spirit varnish manufacturers described it as equal in all respects to American rosin, and quite suitable for making certain qualities of spirit varnishes. They regarded it as about equal to grade "G" of American rosin, the market price of which was £21 to £22 per ton in London (July, 1916). The normal value of this grade of rosin before the war was about £14 per ton. Another firm of varnish manufacturers carried out

experiments to ascertain whether the rosin could be used to replace American rosin in the manufacture of the cheaper varieties of varnish. The results were very satisfactory and indicated that the Boswellia rosin would be an excellent substitute for American rosin for this purpose. This firm stated that in their opinion the value of the Boswellia rosin would be the same as that of the American product, *i.e.*, 63s. per cwt. in the United Kingdom (September, 1918).

Equally satisfactory reports were furnished by firms in India to whom samples were submitted by the Forest Economist, and it seems quite clear that Boswellia rosin can be used by varnish makers in place of American rosin.

USES OF GUM OF BOSWELLIA SERRATTA.

Three samples of Boswellia gum were received at the Imperial Institute in May, 1916. They all appeared to be composed of the same material and to differ only in the size of the pieces composing the samples. Sample No. 1 consisted of small tears and fragments, No. 2 of small fragments, and N. 3 of very small fragments and dust, with some sand and dirt.

The three samples were analysed with the following results :—

	No. 1 Per cent.	No. 2 Per cent.	No. 3 Per cent.
Moisture	14·4	13·9	12·4
Ash	3·0	3·5	9·3 <i>a</i>
Matter soluble in 95 per cent alcohol ...	23·6	20·7	16·9
Matter soluble in 95 per cent ether	20·9	17·3	11·6
Matter soluble in 95 per cent cold water ...	42·9	48·5	39·2
Specific gravity of a 10 per cent solution at 15/15°C.	1·026	1·023	1·022
Viscosity of a 10 per cent solution at 22° C. <i>b</i> ...	3·6	3·3	2·8

These results are compared in the following table with those obtained in India by the Chemical Adviser at the Forest Research Institute, Dehra Dun, the Imperial Institute results being given under the heading A, and those of the Chemical Adviser under the heading B. In order to eliminate discrepancies due to variation in moisture, the results have been expressed in all cases on the dry materials.

	Sample No. 1.		Sample No. 2.		Sample No. 3.	
	A	B	A	B	A	B
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Ash	3·5	3·4	4·1	4·0	10·6	7·1
Resin (matter soluble in 95 per cent alcohol) ...	27·6	not given	24·0	10·2	19·3	21·2
Soluble gum (matter soluble in water) ...	50·1	not given	56·3	not given	44·8	not given
Insoluble gum and dirt (exclusive of ash) ...	18·8	...	15·6	...	25·3	...
Mater soluble in ether (dry and free from alcohol).	24·4	9·0	20·1	{ 9·4 8·3 }	13·2	{ 18·3 19·4 }

a The average of five determinations which varied from 7·3 to 10·8 per cent; owing to the presence of heavy sandy matter it was difficult to obtain a really average sample of the material.

b As compared with 1 for water and 6·5 for soft Kordofan gum, 7·1 for Sudan Talh gum, and 12·0 for hard Kordofan gum, determined under the same conditions.

It will be seen from these figures that the results obtained at the Imperial Institute for matter soluble in alcohol and in ether (which for either solvent may be regarded as rosin) do not agree with those found by the Chemical Adviser, and the latter points out in the paper referred to at the beginning of this article that the differences are due to the lack of uniformity in the samples.

With the view to ascertaining the suitability of the gum for sizing purposes the following attempts were made at the Imperial Institute to obtain "jellies" from the gum :—

- (a) One part of the gum was allowed to stand over-night with 2 parts of water, and was then heated for one hour in a boiling-water bath and allowed to cool. Only a pasty mass was obtained.
- (b) One part of the gum was allowed to stand over-night with 10 parts of water, after which it was warmed on a water bath and allowed to cool. The liquor was freed from solid matter by being squeezed through calico and the filtrate was concentrated on a boiling-water bath, but no jelly was obtained.
- (c) One part of the gum was heated under pressure with 5 parts of water at 133°C. for 1½ hours, but yielded only a thin, non-homogeneous paste of a brown colour.

From these experiments it appeared that this gum is much inferior to ordinary gum for use as a sizing material, but it was nevertheless submitted to one of the most important British calico-printing firms for trial as a sizing and finishing material for textiles. Their technical experts reported as follows :—

- (a) An attempt was made to obtain a solution in water at a strength of 4 : 10, but even with prolonged heating the result was nearly a rough pasty mass.
- (b) The gum was then heated in a closed bottle for an hour under a steam pressure of 6 to 10 lb. This also failed to produce a smooth paste, though with undoubtedly better results as regard thickness. The material, however, was not sufficiently homogeneous to serve as a thickener or as a sizing agent.
- (c) It was found that a strong solution of caustic soda dissolved the gum, but there was no "body" in the product and subsequent neutralization of the alkali with acid reprecipitated the gum.
- (d) The gum was found to be but little affected by weak solutions of caustic soda, sodium

carbonate or borax, and acetic acid was also without solvent action.

As a result of these trials the conclusion arrived at by the experts was that the "insolubility" of this gum (*i.e.*, the presence of resin and gum insoluble in water) would prevent its employment for the purpose of sizing and finishing textiles.

A further sample of the gum was forwarded to the Imperial Institute in December, 1917. It consisted of a finely ground, light buff powder with a pleasant aromatic odour.

The gum was submitted to chemical examination with the results shown in the following table, which also includes the results obtained at the Forest Research Institute in the case of a sample completely freed from resin and insoluble woody matter :—

	Sample examined at the Imperial Institute	Sample examined in India
	per cent	per cent
Moisture	... 13·1	18·75
Ash	... 3·5	3·28
Water-soluble matter	... 75·7	{ 74·20 <i>a</i> 74·35 <i>b</i>
Alcohol-soluble matter	... 2·7	not given
Viscosity of 10 per cent solution at 22°C. <i>c</i>	... 5·4	
Specific gravity of 10 per cent solution at 20/20°C.	... 1·031	

When dissolved in water the sample examined at the Imperial Institute formed a thick, cloudy, colloidal solution.

It will be seen from the above results that the later sample of *Boswellia* gum is superior in composition to the three previously examined, as it contains much less resin (alcohol-soluble matter) and is much more soluble in water. The viscosity of a 10 per cent solution of the gum is also greater than in the case of the earlier specimens. Even this sample, however, does not compare favourably with gum arabic. A 10 per cent solution in water was cloudy and had a lower viscosity than a gum arabic solution of the same strength; it also darkened when heated and deposited solid matter on standing. The solution was fairly adhesive, but inferior to gum arabic in this respect. The 10 per cent solution did not form a jelly, and was much more liquid than a 5 per cent starch jelly.

a In 5 parts of water.

b Portion dissolved in 60 parts of water by repeated extraction.

c Compared with 1 for water and 6·5 to 7 for gum acacia under the same conditions.

The sample was too small to permit of any technical trials being made, but it seems unlikely that the material could be used to any extent as a substitute for gum arabic except possibly locally in India.

UNDER-EXTRACTED GUM.

Boswellia gum containing 30 to 40 per cent resin has been tried in India as a paper size. A cellulose expert who examined a sample of this material stated that the sizing effect he obtained was sufficiently good to warrant a commercial trial being made.

A sample of this gum was subsequently submitted to an Indian firm for trial under practical working conditions, with the following results:—Two experiments were undertaken with a sizing solution made up by dissolving 100 lb. gum with 3 per cent of 77 per cent caustic soda in 90 gallons of water. In the first experiment 500 lb. of "stuff" were beaten with 40½ gallons of the sizing solution, 25½ lb. of alum were then added; the quantities represented 9 per cent of gum and 5.1 per cent of alum. The sizing results in the finished paper were only considered fair. In the second experiment the quantities used represented 10 per cent of gum and 4.6 per cent of alum. The sizing results were in this case slightly better. In each experiment the wet pulp gave a more or less acid reaction. The firm stated that further trials would be necessary before any general conclusion could be drawn as to the value of the material for sizing paper, but they were of opinion that the large percentage of resin present might cause trouble in the machine, and produce early yellowing and rapid deterioration in the case of white paper.

PREPARATION OF BOSWELLIA PRODUCTS FOR THE MARKET.

The following recommendations are made by Messrs. Pearson and Puran Singh regarding the methods of preparing *Boswellia* products for the market.

Turpentine Oil—The authors agree with the view expressed in the earlier report made by the Imperial Institute that the oil should be marketed in the crude state, and that is inadvisable to rectify it.

Rosin.—Overheating should be avoided in the preparation of the rosin, for this in addition to darkening its colour, reduces its "strength." Care must also be taken to free it from fine particles of dirt by allowing sufficient time for settling in the tanks when the rosin is in a state of solution in the solvent. It seems impossible to remove the dirt at any other stage of working.

Gum.—The refinement of the gum on a large scale has been found to be difficult, and it is recommended that it be placed on the market in the

form of "flour" as is done in the case of similar gums. In the process of grinding and sifting particles of bark are removed.

Under-extracted Gum—If further trial should demonstrate that this product can be used as a subsidiary sizing material, it would be quite easy to stop the extraction of the gum-resin at a fixed point in order to produce the mixed substance.

COST OF MANUFACTURE OF BOSWELLIA PRODUCTS.

In the form of a profit and loss account, Messrs. Pearson and Puran Singh have tabulated a rough estimate of the cost of preparing 77 gallons of turpentine oil, 55 maunds (=about 2 tons) of rosin, and 22 maunds (=about 16 cwt.) of gum, from 100 maunds (=about 3½ tons) of the crude *Boswellia serrata* gum-resin. The estimate of the total cost of collecting, distilling, interest on working capital, depreciation on plant, packing, insurance, etc., at 780 rupees (=£52). The values of the receipts are based on pre-war rates; the turpentine oil at 2½ rupees (=3s. 4p. per gallon, the rosin at 10 rupees per maund (=18s. 2d. per cwt.), making a total of 852½ rupees (=£56. 16s. 8d.). This would represent a profit of 72½ rupees per 100 maunds of gum-resin (=£4. 16s. 8d. per 8,228 lb., or nearly 1s. 4d. per cwt.).

The authors state that it will be necessary to confirm this estimated cost of manufacture in a single unit plant, before carrying out operations on a large scale; that there seemed no question of doubt as to finding a ready market for the turpentine and rosin, but that it was rather difficult to predict the market value of the gum, which, however, should sell readily at the above low price given in the estimate.

The above investigation has shown that *Boswellia serrata* gum-resin which has hitherto been employed in India to a small extent chiefly as a substitute for *B. Carteri*, and *B. Frereana* in the preparation of incense, is capable of furnishing products of considerable commercial importance and it seems probable that their preparation will constitute a profitable industry.

SERICULTURE.

Sericultural Experiments in India.

The following are extracts from the Report on the Progress of Agriculture in India for 1918-19, just published —

As an outcome of the recommendations made by Professor Maxwell-Lefroy in his report on the sericulture industry in India, a protozoologist has recently been added to the staff of the Imperial Department of Agriculture in India to investigate the diseases of silkworms. The establishment of a central seed store depote with a view to supply healthy seed to growers is under the consideration of the Government of India, and has been referred to Local Governments for their opinion. The establishment of such a central seed store must, however, await the results of the protozoologist's investigations.

At Pusa, work continues with the multivoltine mongrel races of mulberry silkworms which have been established by crossing univoltine and multivoltine races. It has been found that the yield of silk from the first generation of these mongrel crosses is always better than that in later generations which deteriorate gradually. Attempts are being made to prevent this deterioration by the infusion of new blood in the mongrel races. A rabe has now been established which, on crossing with univoltine races, changes the resultant mongrel races into multivoltine in five or six generations, so that any univoltine races can be made multivoltine in a comparatively short time. Mulberry and *eri* silkworm eggs were supplied to several provinces, Indian States and other applicants from all parts of India as well as to several foreign countries. One Pusa reeling machine was supplied to the Agricultural Department, New South Wales, and another to the Indore State. Many enquiries regarding rearing, reeling, dyeing, bleaching, spinning and twisting have been dealt with, and four students have received short courses of training in sericulture during the year.

In Bengal work on the improvement of the mulberry silkworm races by hybridization is in progress. The object is to evolve superior multivoltine hybrid races which will retain the good characteristics of the indigenous races and, at the same time, yield more silk. By selection from a very large number of hybrids, the department has now obtained four principal types of good promise. These races, which had previously been reared on an experimental scale only, have, since March, 1918, been reared on a field

scale with a view to avoid any chance of experimental errors. It is satisfactory to note that so far they have not shown any signs of degeneration.

In the Punjab, sericulture has received a great set-back on account of the failure of the year's crop due to late arrival of the seed from France. Necessary precautions have been taken to avoid the recurrence of such a mishap, and as the province has now got a whole time Entomologist it is hoped that the subject will receive more attention than it has hitherto been possible to give to it.

In Burma, the sericultural experiments at Amarapura were continued but considerable difficulty was experienced in supplying mulberry leaves to growers during the hot weather. Mr. H. A. Thornton, C.I.E., I.C.S., has continued his efforts to start the industry in the Northern Shan States on sound lines, and has obtained from Pusa the services of two skilled men to give local training in the methods of rearing silkworms. Two demonstrators have also been posted to Paukkaung in the Prome district to train the silk-breeders there.

"TUKRA" OF MULBERRY.

It has been definitely ascertained that the "Tukra" or "Kokra" disease of mulberry is caused by a mealy-bug (*Phenacoccus hirsutus*), which is found on the plants together with *Pseudococcus virgatus*. The nymphs as well the adult females congregate on the shoots of the stems and cause their malformation in infested mulberry plantations. The growth of the affected plant is retarded while the lower lateral leaves become wilted and drop off. The affected apical leaves, if served to mulberry silkworms, cause "flacherie." The presence of this mealy-bug is indicated by ants (*Monomorium indicum*) which attend the scale insects for the sake of their honeydew. Ten generations of *Phenacoccus hirsutus* were reared at Pusa during the year and its parasites and predators were also studied, together with the means of its dispersal and the best method of treating affected plots.

PEBRINE.

Owing to the use of multivoltine races of silkworms in India and the generally insanitary conditions under which rearing is carried out, it is essential for the rearer to begin his season with disease-free seed. In default of this the rapid cumulative effect of any small percentage of disease initially present will, in the course of rearing the numerous broods characteristic of these races, inevitably result in the failure of a fatally large proportion of the worms. For this reason it is necessary to adopt in India a much higher standard of purity in the seed issued by grainages than is customary in England. The method of examination

of moths devised by Mr. Hutchinson to meet this necessity, referred to in the last year's report, has been adopted by various *grainages* in India and favourable reports on the success of its use are being received. Mr. Hutchinson was engaged in further study of the problem of elimination of this disease which included trial of the effect of hill-rearing upon the natural resistance of the larva to infection. Experiments were carried out at Shillong during August and September and it was found that even in the first generation a considerable increase in resistance to infection was obtained in the hill-reared larvæ. Eggs from the latter were transferred to Pusa both from infected and from disease-free moths, and further resistance to infection in the plains was noted in the latter, whilst in the former a smaller percentage of infected larvæ resulted from the hatching out of seed from the diseased moths. The infected larvæ survived through a greater number of moults and a larger percentage of them attained maturity than is usual in such cases. It was also noted that the hill-reared worms produced better cocoons. A Memoir by Mr. Hutchinson on the mechanism of infection and the elimination of pebrine in India is now in the press.

MEDICINAL PLANTS IN INDIA: PROSPECTS OF CULTIVATION.

Appointment of a Committee.

The Secretary to the Drugs Manufacture Committee has issued the following Press *communiqué* :—

At its 34th meeting held at Simla on the 20th May, 1918, the Board of Scientific Advice accepted a proposal for the formation of a Drugs Manufacture Committee to investigate the possibilities of the cultivation of medicinal plants in India and the manufacture of drugs from them on a commercial scale. The Government of India have acted on this recommendation and have appointed a Committee whose primary functions will be to investigate (1) the possibilities of the cultivation of medicinal plants in India, and (2) the manufacture of drugs from them on a commercial scale.

With regard to (1), the Committee will consider the various lines on which the investigation can best be undertaken, while in connection with (2), it will consider the present position as regards the manufacture of drugs in India from indigenous products

and the Indian requirements of such drugs as have up till now been imported from abroad. As soon as experience has proved that any drugs can be manufactured at Government Medical Store Depots at a sufficiently low cost, private enterprise will be invited to undertake its manufacture.

The first meeting of the Committee was held at Simla on the 20th May, 1919, when it was resolved *inter alia*: (a) that the main investigation of the Committee should be conducted in the laboratories of the Government Medical Stores Department and that the question of the manufacture of drugs from other than vegetable sources should come within the scope of the Committee's work; (b) that measures should be taken for ascertaining the geographical distribution of various medicinal plants throughout India and the extent to which they are now cultivated; (c) that the operation of the Committee should include the investigation of indigenous drugs which are not at present included in the British pharmacopœia; (d) that the Committee should give every assistance to any organization which is brought into being for the purpose of investigating and manufacturing preparations designed for use against disease-carrying and other insects; and (e) that local Governments and administrations should be informed of the establishment of the Drugs Manufacture Committee and requested to furnish the Committee with any information likely to be of value. The personnel of the Drugs Manufacture Committee as at present constituted is as follows :—

The Director-General, Indian Medical Service, Member and Chairman *ex-officio*; the Assistant Director-General, Indian Medical Service (Stores), Member *ex-officio*; and Secretary.

Members: The Agricultural Adviser to the Government of India; the Director, Botanical Survey of India; the Director, Geological Survey of India; Mr. F. M. Howlett, Imperial Pathological Entomologist; the Assistant Inspector-General of Forests; the Advisory Chemist, Madras.

All communications should be addressed to the Secretary, Drugs Manufacture Committee (Office of Director-General, Indian Medical Service).

Considerable progress has already been made as is shown by the fact that, among others, the following articles, which, prior to the war, were imported, are now being manufactured in the Government Medical Store Depots:—Absolute alcohol; Aloes preparations; Amylum, B. P. (Starch); Argenti Nitras; Argenti Nitras Induratus; Belladonna preparations; Borated Talc powder; Calcium Carbonate precipitated, B. P.; Calcium Chloride; Calcium Phosphate; Calcium Sulphide solution; Citric Acid

and Citrates; Collodium; Collodium Flexile; Creta Preparata, B. P.; Digitalis preparations; Extract Belladonna Siccum; Extract Cascara Sagrada Liquidum; Extract Cascara Sagrada Siccum; Extract Colocynth Co. (dry extract); Extract Glycyrrhiza Liquidum; Extract Hyoscyamus; Extract Nux Vomica Siccum; Extract of Vitamina; Extract Opii Siccum; Ferri Sulphas; French Chalk; Glucose; Iodine powder; Keratine solution; Lysol; Magnessi Carbonas Levis, B. P.; Mannite, Nux Vomica preparations; Oleic Acid; Oleum Anethi; Oleum Anisi; Oleum Carrophylli; Oleum Cedri; Oleum Chaulmogræ; Oleum Crotonie; Oleum Myristica; Oleum Santali; Oleum Theobromatis; Oxymel Scillæ; Potassium Carbonate, B. P.; Pyroxylum; Rectified Alcohol; Sapo Mollis; Sodium Carbomas, B. P.; Sodium Chloride chemically pure; Sodii Nitris; Sodii phosphas; Sodii Sulphas; Syrupus Ferri Phosphatis Co.; Talc; Talc purificatum; Tannic Acid; Thymol, B. P.; Tinctura Colochici U., M. jC shrdlu aoinu Tinctura Colchici Cormus; various mercurial B. P. preparations.

MYSORE ECONOMIC CONFERENCE.

SHOWS AND EXHIBITIONS.

Cattle Show at Churchankatte.

In connection with the *Jatra* at Churchankatte held in January last, a Cattle Show was held on the 17th idem. There were about 28,800 heads of cattle at the Show, and the tolls collected on shops and cattle amounted to Rs. 3,600. The Sub-Division officer, the District Economic Superintendent, the District Sanitary officer, Mr. Rama Row of the Palace Veterinary Department, besides the representatives of other departments were present during the busy portion of the *Jatra* and ran the Show. A committee of six gentlemen was appointed to select cattle to be let into the Show stall and those deserving of prizes. Prizes in the shape of gold and silver medals of the aggregate value of Rs. 200 were distributed by the Sub-Division officer to the owners of deserving cattle. Certificates were also issued to the winner of each medal and photoes of prize-winning cattle taken. The total income from tolls, manure and golaka was Rs. 4,163-5-3 and the expenditure amounted to Rs. 960-13-10. The Agricultural Inspector of Mysore District exhibited agricultural implements and the Sericultural Inspector held a demonstration of sericultural exhibits.

BOOKS IN BRIEF.

On the payment of National Debt.—By W. L. Jordan, Author of *Standard of Value, etc.* Published by Simpkin, Marshall, Hamilton, Kent & Co. Third Edition.

This is a reprint of four letters addressed to a statesman by the author. Mr. Jordan urges, in these letters, a capital levy to clear off *all* the existing debt. He outlines a scheme for the purpose. He thinks his scheme is a practical one. He is of opinion that it is better for the industrial development of the country if it is allowed to work immediately without being hampered by income-tax or without the burden of an annual charge of £450 million a year for 55 years. Mr. Jordan quotes Ricardo in support of his view and the scheme he propounds is no doubt an attractive one. The examples of those European countries which have adopted it do not encourage us in the hope that its effects are all for the good of the country or nation adopting it. Still Mr. Jordan's views are shared by many in England and a really democratic Government may not shrink from them. We must say Mr. Jordan puts this case pointedly and briefly in his letters and any dispassionate person reading it is likely to be favourably impressed by the soundness of his arguments.

Loans Versus Taxes in War Finance.—By Edwin R. A. Seligman, Professor Columbia University.

This booklet forms publication No. 1165 reprinted from *Financing the War*, Vol. lxxv of the Annals of the American Academy of Political and Social Science, Philadelphia. In it Professor Seligman considers at length the vexed question of loans *versus* taxes in war finance. His conclusion, which we give below, is the only sound one that any practical financier can arrive at. It is quite in keeping with the views of financiers and economists in England. Professor Foxwell, for instance, has propounded nearly the same views in several of his articles on the subject of War finance. Professor Seligman thus summarises his conclusion:—
(1) Government loans are indispensable to a sound war finance. If properly used they tend to lighten the burden of war. (2) To attempt to finance a war exclusively through loans is short-sighted. (3) To attempt to finance a war exclusively through taxes is suicidal. (4) War taxes should be large and immediate, but should never be stretched beyond the point where they begin to lessen the social output, to hamper the transfer of pre-war to war production, on to press unduly on desirable consumption. (5) War

taxes must be high enough to assure a solid foundation for the loans and to ensure a rapid payment of the debt within a relatively short time. (6) At the outbreak of a war, and during the early period, very much greater sums ought to be raised by loans than by taxes. (7) As the war proceeds a continuously larger amount can and should be raised by taxation, although at no time will the Government be free from the necessity of relying to a considerable extent upon the use of public credit.

Currency Reform in India.—By V. G. Kale, Professor of Economics, Fergusson College, Poona. Published by Aryabhushan Press, Poona City.

A reprint of articles contributed to various journals, with additional chapters of importance, this book deals with a matter of great interest to this country. In it Professor Kale urges earnestly for a currency system solely intended in the interests of India. He pleads for an effective gold standard with free importation of gold into the country. He also pleads for the establishment of a gold mint in India, the issuing of gold notes to expand the calculation of notes of small denominations, with improved facilities for free and ready encashment of same, for the issue of subsidiary coins of a metal other than silver to relieve the pressure on rupee circulation and for the establishment of a State Bank in India for undertaking all the banking work of this country. Professor Kale's book deserves a wide circulation, for it is both informing and sound.

Mass and Agriculture.—By Nagendranath Gangule, B. Sc. (III)—Published by the Commonwealth Office, Adyar, Madras.

This little book deals with some of the lessons to be derived from one aspect of war's effects—on Agriculture. Its object is to enable people to form a healthy public opinion in favor of a constructive agricultural policy in this country. Some of the topics dealt with are:—War and agriculture, increased food production from soil, food conservation and food distribution. Harvest prices of jute forms Appendix A. Agricultural Reconstruction in Great Britain and Ireland taken from this *Journal* forms Appendix B. The book is a suggestive one and ought to achieve its object.

Inflation.—By J. S. Nicholson, M. A., Sc. D., L. L. D., Professor of Political Economy in the University of Edinburgh. Published by P. S. King & Son Ltd., Westminster, London.

Recently we reviewed in these columns Professor Cannan's book on "Money" and in that connection drew attention to his views on inflation. Here is another book by Professor Nicholson on the same subject. It is a highly stimulating one. Professor Nicholson says that "our greatest present need is to get back to a

sound monetary system and to get rid of the mirage of inflation". Again, he says: "The principle cause of the disorder of the body politic is the abuse of paper money. "The great expansion of currency is the root of all our economic ills." He tells us plainly that he has called his book "inflation sans phrase" because he explains, "the word suggests besides the usual monetary meanings, all sorts of flabby moralities and bombastic utterances. We want to get back not only to hard money but to hard thinking, we live in the world of money and when anything goes wrong with the money our whole world is shaken." The book is no mere destructive piece of work. As may be expected from one so high in Economic thought as Professor Nicholson is, it is full of meat. No book of the size has, so far as we know, dealt with the whole subject of war time finance in a more illuminating manner.

Mysore Forest Trees.—By Rao Saheb M. Rama Rao, Special Forest Officer in Mysore. Printed and Published by Bangalore Press, Bangalore.

Rao Saheb Mr. Rama Rao, Special Forest Officer, Mysore, has favoured us with a list of Mysore Forest Trees which is of much interest, both as a botanical record and as a guide to persons concerned with the industrial expansion of the State in connection with its forest resources. The one book now available on the subject is Camerons "Forest Trees of Mysore and Coorg" which was published a quarter of a century ago; and regarding which Mr. Cameron himself when publishing it wrote: "But although our knowledge of arboriculture is improved, a reference to the text will reveal that there is still much to be learnt concerning the identity, nomenclature, utility and treatment of local trees; and, until these sources of information have been fully explored and exhausted, we cannot hope to possess a complete Hand-book of the Forest Flora of Mysore and Coorg." Mr. Rama Rao, in the publication under reference, has successfully attempted a compilation which will be within the easy reach of persons anxious to obtain more or less reliable information regarding the economic value and commercial possibilities of little known trees within the State, their distribution and their future value towards meeting the new demands for special kinds of timber in India from foreign countries, where the economic progress made is on a vastly higher plane than has been achieved in this country. Mr. Rama Rao's list of trees does not pretend to be either exhaustive or meticulously accurate in all respects. His information has been obtained from existing publications most of which is enshrined in costly and bulky tomes not ordinarily accessible to merchants and consumers—and from personal investigation extending over a period of two and half years. The last is calculated to be

of some assistance in ascertaining the economic uses of the trees mentioned in view to the collection of further information regarding their local uses, distribution, extent of occurrence, their properties, durability, identification, sources of minor forest produce in tannin materials, resins, oils, etc., and their suitability for particular manufactures. Owing to the miserable industrial condition of India, as a whole, the exploitation of forest resources has been limited, to only a dozen kinds or so of Forest trees, with the result that a very serious depletion of such trees has occurred; and if Mr. Rama Rao's list influences the consuming public to avail themselves of other less known timber in any degree, not only will the drain on the timbers hitherto over-exploited for most purposes, be lessened, but will help to placing equally useful and suitable timbers for house construction and manufacture of all kinds on the market to the financial benefit of the State. It is the same case in Travancore where the forests have been grievously overfelled in respect of teak *Marudu*, *Vengai* and half a dozen other species. Mr. Rama Rao's list comprises nearly 500 trees including the coniferæ which are not indigenous—cycads, palms and bamboos. One of the great wants of India is wood suitable for the making of pencils, and from the column of uses to which various timbers can be put, we note that Mr. Rama Rao mentions several trees which in his opinion, might be found of use. It is possible that practical experiment might demonstrate that Mysore at least, and other parts of India where similar trees exist will be able to furnish pencil making trees equal in value to the Juniper timber of British East Africa upon which the Inspector-General of Forests in British India declared, at the last sessions of the Board of Forestry, held in March and April of last year, we are wholly dependent for the manufacture of first grade pencils. A perusal of the list, it is interesting to note, that the *Juniperus procera* or the East African pencil cedar, apparently the same tree mentioned by Mr. C. S. Hart, C.I.E.—has been imported into Mysore and is "growing well" in the Lalbagh and in the grounds of certain forest lodges in the State. If the trees continue to flourish there is no reason why they should not be extensively planted up for future use.

In Mr. Bourdillon's list of over 550 havacane trees—some few of which are shrubs—there are many which grow in the uplands and deciduous forests of Mysore indicating that Mysore climatic conditions favour the growth of trees which are mostly formed in the hilly tracts of the West Coast where the rainfall is exceptionally heavy. If we make no mistake Mr. Rama Rao, when Conservator of Forests in Travancore, added considerably to the information to Mr. Bourdillon's list, and it seems to us that a con-

ference of Forest Conservators of the Native States in South India not excepting the Hyderabad Dominions would serve a useful purpose in comparing the forest resources of each State in view to combined action in developing them in commercial and industrial directions. Mr. Rama Rao deserves immense credit for his compilation inasmuch as it forms the basis on which "a cheap and exhaustive Handbook containing full information on the structural characters and properties of Mysore woods and minor products, their present local uses, their future industrial, economic and commercial possibilities, their geographical distribution and extent of occurrence, their local nomenclature in different parts of the country etc., will soon be made available for the use of forest officers and the intelligent sections of timber traders and consumers. May we be pardoned for making one suggestion. It is to supply besides the Mysore Vernacular names, the Malayalam, Tamil, Telugu and wherever possible the Hindustani nomenclature for easy reference by men who do not know Latin terms known only to the uninitiated. Another suggestion is that in investigating the properties of the trees the calorific value of the various trees commonly used for domestic, cooking, furnaces, etc., should if possible be determined. The fuel problem of India is of very great importance and economy in the use of fuel is a desideratum which deserves attention. From a financial point of view the price of fuel could be regulated by its calorific value.

ACKNOWLEDGMENTS.

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MYSORE ECONOMIC CONFERENCE.

BY THE EDITOR.

THE next session of the Mysore Economic Conference will be held at Mysore on the 1st June. This is the first session of the Conference to be held under the new organization adopted last year. This organization has been described in previous issues of the *Journal*. Put briefly, it seeks to give permanence to the Conference as an institution, and decentralizes its work in the State by making over a part of it to the District Boards. For this purpose, the necessary alterations in the laws governing these local bodies have been notified and doubtless will be pushed through the legislature in due course. These alterations in the law will not only give a statutory basis to the carrying out of Economic work in the districts but also make it obligatory on the bodies concerned to give adequate attention to it. This work should in the future attract greater attention at their hands, as the development of the areas included in the different districts is, or rather ought to be, their main concern. The position in some districts at least is such that the Economic amelioration of their people ought to be the primary concern of both the Government and the people resident in it. To aid the local bodies

Government will doubtless, if found necessary, extend such help as may be required during the preliminary stages. One thing which we would like district bodies to consider carefully is how far their machinery is suited for their work. The work is fairly clearly chalked out for them and they should see what particular machinery they require for carrying it out. The old organization in the district was of one kind but since the district bodies have secured control over this work also, they should see if they want any change, and if so of what kind. This apart, they should also see how their supervisory power should be exercised. They may also consider how they should co-ordinate the work in the villages, taluks and districts in order to make the new scheme a success. This subject is of the utmost importance and we should like to see it taken up in earnest by the members of the various Districts.

The War is now happily over, though we are still in the transition stage from war to peace. The Economic conditions in the west during the past twelve months have been not of a reassuring kind. But these conditions are found to pass away before long and with it the trade boom will commence. For this, our people should prepare themselves. They should if possible prepare from now on what objects they should concentrate their attention. What, for instance, they should raise as commercial corps; what they should manu-

facture on a large scale, and what large industries they should take up. If this were done, we would soon be in a position to see what machinery we might require and make arrangements for its importation. The demand for machinery is great and orders from Japan are said to be so great that English firms are reported to be full up with them. Machinery of certain kinds can never be imported at a moment's notice. Early booking is necessary and this is not possible unless we push through our arrangements. Whether it is a Paper Factory or a Cotton Mill the suppliers will want adequate time and unless we take heed we may not be in a position to give them this. Otherwise the result will be disappointing and there will be no body to blame but ourselves.

Among the subjects that we should like to see discussed at the next Conference in a business like way is the question of the promotion of large industries in the State. Again and again this has been discussed but so far no satisfactory conclusions have been arrived at. Government cannot be expected to pioneer all industries. That being so, what special measures are necessary to enable people in the State to start large industries? The Indian Industrial Commission point out in their Report (see paras 294 to 300) the circumstances in which Government financial assistance may be given to large industrial undertakings. *Inter alia* they state (para 298) the capital required by them should be raised in India in rupees. It would be profitable to know how far we should follow this principle in our own State. This, however, is only one of the many subjects which will require attention at the next Conference. It would, as in the past year, be advantageous to concentrate attention on the more important and urgent questions—including those of policy—and discuss them fully instead of spreading out the limited time available on a larger number of subjects some of which at least might well wait for their turn in the coming years. A carefully chosen agenda would, from this point of view, be a valuable and in fixing public attention on what is urgently required by the country from a *practical* point of view. A Conference of this kind serves its purposes best when it takes a thoroughly practical interest in matters affecting the Economic advancement of the people of the State.

CO-OPERATION IN MADRAS,

1918-19.

BY "RUSTICUS."

MR. Hemingway's Report on the working of his Department for last year would be even more valuable than it is if he had not made it difficult in some places to see the wood for the trees. There are far too many statements in the body of the Report and several of them are not at all easy to follow. As our readers must be aware by this time, the figures which we regard as supplying by far the best test of the soundness of the co-operative movement in any Province are those of outstanding arrears. Mr. Hemingway furnishes figures of demand, collection and balance separately for principal including arrears, interest due in previous years and interest due in 1918-19. It would, one would have thought, have been easy to show exactly how societies stand in respect of arrears of principal and interest combined both in relation to their central banks and to their members but the reader is left to work this out for himself. The result of the sum is distinctly satisfactory especially when it is remembered that Madras, though better off than some other parts of India, by no means escaped the effects of the bad monsoon of last year and was also ravaged by influenza. Of a total demand of Rs. 139½ lakhs for all classes of societies, provincial and central banks, agricultural and non-agricultural societies, about Rs. 25¾ lakhs were still in arrears at the close of the year, a percentage of rather less than 19. Comparisons are notoriously invidious but there are two or three provinces in India where the arrears are over 50 per cent. Madras has, therefore, every reason to be congratulated. At the same time, the Local Government do well to express the hope that better results will be achieved

this year for the accumulation of arrears is one of the first signs of retrogression.

The number of societies in Madras in 1918-19 increased from 2,718 to 3,676, the number of members from 191,000 to 244,000 and the working capital from Rs. 234,92 lakhs to Rs. 305'79 lakhs. In other words or rather figures, societies increased by 35·2 per cent, members by 28 per cent and working capital by 30 per cent. This represents a far more rapid rate of increase than has been achieved in any year since the co-operative movement was first started. That expansion has not been secured at the expense of stability in past years is shown by the fact that the registration of only ten agriculturals and two non-agricultural societies was cancelled during 1918-19. There would appear to be a few societies in Kistna and Madura which deserve liquidation but the Registrar is probably right in endeavouring to see what can be done by re-organization before proceeding to extreme measures. We could wish that other Local Governments were as ready as is the Government of Madras to realize that, encouraging as the progress of the co-operative movement has been, the work which has so far been accomplished represents little more than a few drops in the ocean. The Government of Madras point out that the number of villages affected by the societies at present in existence bears but an infinitesimal proportion to the total number of villages in the Province and that there is a vast field for expansion. Many tracts have been left almost untouched or only partially developed and this is due partly to geographical reasons and partly to lack of sufficient propagandist work. If the full benefits of co-operation are not to be confined to a favoured few, a greater effort must be made in the future and more propagandist work must be undertaken to achieve the end in view. It is obvious that this means more staff and it is satisfactory to see that the Local Government are quite ready to provide for a large increase. But however

large the Government staff it will always be insufficient. It cannot be too often reiterated that the future of co-operation in India depends upon the non-official worker. Madras has, on the whole, been fortunate in this respect but, as the Government review emphasizes, there is always need for more.

As a general rule, the working of agricultural credit societies in the Provinces calls for little comment from us. It has become somewhat stereotyped and it is not often that the Registrars have any fresh light to throw on it. Mr. Hemingway's Report is a welcome exception. He has carried out an interesting census of the membership of this class of society, which we need hardly remind our readers is much the most important of all, and has found that of the 171,262 members at the end of the year, 23,783 were non-agriculturists and 20,226 lived partly by agriculture and partly otherwise. Of the 127,253 agriculturists, 13,022 were non-cultivating landholders, 93,267 were cultivating land-holders, 16,853 tenants and 4,111 were field labourers.

The correctness of Mr. Hemingway's conclusion that these figures show that the societies are not serving the poorer members of the community cannot be disputed. He states that he has discussed the matter with the representatives of several hundred societies and they admit that this is the case. They urge that it is difficult and dangerous to lend money to a man with little or no tangible property. Mr. Hemingway pointed out to them—it is discouraging that it should be necessary to point out so obvious a truism at this stage—that the essence of co-operative lending is that it should be based largely on character and not wholly upon tangible security and that if societies decline to admit poorer members or to give them money, they fall far below the co-operative ideal. Mr. Hemingway says that most of the village co-operators with whom he discussed the subject expressed themselves in agreement with this view and promised to mend their ways.

If they do not, he considers that it will be necessary to organize a large number of separate societies for the poorer classes. Madras has already done quite well in this direction. There are 233 societies of all classes in which 25 members or not less than two-thirds are Panchamas, an increase of 73 on the previous year. To revert for a moment to the statistics of agricultural credit societies, classification by caste showed that 20,782 members of these societies were Brahmans, 119,485 non-Brahman Hindus, 9,431 Christians, 9,821 Muhammadans and 10,050 Panchamas. The Panchama membership increased during the year by 2,972.

A second very important feature of the working of agricultural credit societies on which Mr. Hemingway comments is the extremely small proportion of the number of loans to the number of members of societies. He thinks that the figures he gives for the loans granted by agricultural societies—in 1918-19, Rs. 66.61 lakhs in 77,579 loans—prove conclusively that societies are not finding all the money that their members can legitimately expect to borrow from them and that this is partly due to the difficulty and delay in getting money from the central banks. Mr. Hemingway's further remarks on this point deserve quotation *in extenso*. "A man cannot wait for several weeks to get money from the bank. Special arrangements are being made by many of the banks to give the societies facilities for speedy accommodation which will largely get over this difficulty. But I am afraid that it is also true that societies are afraid to lend their members the amount of money which they know their members must have, if not from them, from some one else in order to carry on their agricultural operations and maintain their families. Indeed, in some few societies it is the rule that no new loan should be given to a man until he has completely discharged his prior debts to the society. A little reflection

should, however, convince any co-operator that it is as bad for the society, as it is for the member, to allow him to go outside the society for the money that he reasonably requires instead of accommodating him from the society's funds. If he takes money from the sowcar, he is exposed to loss owing to the rapacious terms of the lender. It generally results in the applicant selling his produce on the threshing floor—a source of serious loss; and if he is exposed to this loss, he is obviously not in so good a position to pay his debts to the society as he would have been if he had borrowed his extra money from the society at reasonable terms. I trust our societies will succeed better in future in meeting the reasonable requirements of their members."

Madras is still much behind Bombay in regard to agricultural societies for purchase, purchase and sale and production but substantial progress was recorded last year. Particularly interesting are the societies which were formed at Tindivanam and in South Kanara. The Tindivanam society is a combination of society and individual members and its primary object is to prepare the raw produce of its members for market. It has purchased two cotton gins and a 36 horse power oil engine and proposes also to purchase two decorticators for groundnut and a disintegrator for the manufacture of bone meal. It has also obtained the loan of three hand cotton presses from the Agricultural Department. It has a substantial share capital and is regarded by the Registrar as a most promising venture. The South Kanara Garden Planters' society operates over an area rather larger than a taluk and its members consist of growers of areca and other garden produce. Its main business is the sale of this produce through its agents in Mangalore. Although it was only started last year, it had a turnover of nearly Rs. 4 lakhs and obtained prices higher by nearly Rs. 20,000 than would have been secured through the ordinary channels. Nearly 200 credit societies added joint purchase of their

members' requirements to their ordinary business. In addition to the purchase of Burma rice and other food, a measure stimulated by the scarcity of food prevailing in many districts, societies bought salt, kerosene oil, fish guano, seed grains of various kinds and cotton seed. The amount of the trade done was over Rs. 3 lakhs and the profits over Rs. 60,000 which shows what may be gained by the elimination of the middleman. Joint sale of produce did not make such a rapid advance. Sales amounted to Rs. 50,343 and profits to Rs. 2,415 only. As Mr. Hemingway points out, the smallness of the profits is evidence that much has still to be learnt about this branch of trade.

Non-agricultural societies, both credit and non-credit, increased greatly in numbers. As to their working, it is only necessary to remark that the results of the year, so far as weaving societies were concerned, confirm the conviction which has more than once been expressed in these columns that the Co-operative Department is engaged in a hopeless task in attempting to assist the weaving industry. In a good year, from the point of view of the cloth trade, the ordinary cloth merchants offer more attractive terms to the weavers than does their society. In a bad year, co-operation degenerates into philanthropy. Our own view is that the sooner it is recognized that the handloom industry has no future before it, the better it will be for all concerned.

In Madras, the union for supervision only is preferred to the guaranteeing union. There are now 102 local supervising unions, to which all but 410 agricultural societies are affiliated. Every district in the Presidency, with the exception of Bellary, Ramnad which is served by the Madura Bank and the Nilgiris which depends upon the Coimbatore Bank, has a central bank of its own. The efforts which are being made to reconstitute the Provincial Bank into a genuine federation are making very slow progress and it is now several years since this project was first mooted.

Mr. Hemingway mentions that the relations between the Co-operative Department and the Industrial and Agricultural Department were most cordial. It is vital to the development of all three Departments that the connexion between them should be as close as possible.

ENGLISH SYSTEM OF LOCAL SELF-GOVERNMENT.*

BY THE HON'BLE MR. SURENDRANATH BANERJEA.

I have signed the collective report of my colleagues. By the terms of our reference each member of the committee is required 'to advise his own local Government as to the desirability of adopting any feature of the English system in provincial legislation.' This note is intended to meet this particular point in the reference. It applies to Bengal though I think in view of the close relationship between the different systems of local self-government throughout India, all deriving their basal principles from Lord Ripon's Resolutions of 1881 and 1882, my observations will have a general and more extended application, subject, of course, to varying local conditions.

LOCAL GOVT. BOARD FOR BENGAL.

My first suggestion is the creation of a local Government Board for Bengal, and I see no reason why a similar institution should not be established in all the provinces where the conditions are not dissimilar. With the introduction of responsible Government the institution of local Self-Government will enter upon a new phase. The Montagu-Chelmsford scheme recommends (paragraph 188) that there should be as far as possible complete popular control in local bodies and the largest independence for them of outside control. This two-fold object would be secured by making the local bodies wholly elective in their personnel and constitution as under the English system, by relieving them largely of the restrictions to which they are subjected in regard to the details of administration which indeed has been done in a considerable measure in Bengal, and by placing them under the supervision and control of a Local

* Report submitted to the Government of India

Government Board as in England. The English system of having alderman on Municipal Boards may be considered and perhaps tried. This will help to do away with the system of Government nominations and yet secure the services of persons of distinction who may not care to contest elections and of men belonging to small minorities who may have no chance of success in open elections. The proposal for the creation of a local Government Board has been under the consideration of the Government ever since the inception of the institution of local self-government. It was considered for Bengal in 1882 and was negatived by the Secretary of State. Lord Morley referred to it in his despatch of the 27th November, 1908, observing that it should be considered 'how far in each province it would be desirable to create a department dealing exclusively with these local bodies guiding and instructing them, correcting abuses in a form analogous to the operations of the local Government Boards in this country.' The question came up for consideration before the Decentralization Commission in 1909 and was rejected by them though the late Mr. R. C. Dutt, the only Indian member of the Commission was in favour of it. Indian opinion whenever it has an opportunity of expressing itself supported the idea of a local Government Board. A resolution was moved in the Imperial Legislative Council in 1914 recommending the creation of local Government Boards. It was largely supported by the non-official Indian members, but the Government did not see their way to accept the recommendation. The views of the Government of India, however, like those of all progressive Governments have now undergone a change; and in their resolution dated the 16th May 1918, they 'suggest for the consideration of the Provincial Governments the constitution of a central body which should co-ordinate the experience of the local bodies and provide improved control and guidance by entertaining further inspecting establishments if

necessary.' The resolution goes on to add: 'Such a central body should be in direct touch with the Government and might fitly be presided over by a member of the Executive Council. It should further be considered whether in place of a formal Board there might not be Standing Committee for local and municipal affairs in direct contact with the Government to be largely drawn from elected members of the Legislative Council.'

ABSENCE OF CONTINUITY OF POLICY.

The Government of India recognise the need of co-ordinating the work of the local bodies. In Bengal, and I presume, it is the case in other parts of India, the local bodies are supervised by the magistrate of the district and the Commissioner of the division where there is one. The result is that the degree and the quality of the supervision differ in different places. There is no guarantee of the continuity of a definite policy or of the steady growth of sanitary and other improvements. I have been informed of works of Sanitary improvement started by one magistrate which were suspended by his successor on his transfer to another district. If there was a central supervising authority such contingency would be impossible. Under existing conditions the efforts of local bodies are often dissipated. Acting in their individual spheres and as isolated units without a central co-ordinating authority they often lack method, initiative, expert knowledge and organized effort which at times as in the case of drainage and water works must extend beyond their immediate local jurisdictions. Local Governments in the conditions which are now about to be established in India must play an increasingly important part in the administration of the country. It will deal with sanitation which in the Bengal is the most vital problem and also very largely with the sphere of Education. Expert knowledge and guidance will be needed. Obviously the district officers, and I mean no reflection upon them, are not as a rule experts in these matters; and if even they

were, the demand upon their time and attention are so multifarious in connection with the general administration of their districts that it would be impossible for them to do justice to them. The Government of India indeed express the view in the resolution to which I have referred that 'the powers of collectors and commissioners should be maintained,' in connection with local affairs. I submit that if there is to be a central authority the interposition of intermediary authorities would not only be unnecessary but would complicate the working of the machinery and cause avoidable delay. It should be open to the central authority to invoke the assistance of the collectors and the commissioners for information and report but neither the district officer nor the Commissioner of the division should have a recognized or statutory place in the new machinery of local Government.

It will be seen from the extract which I have quoted that the Government of India suggest for the consideration of the local Government the formation of a local Government board. It should, in the opinion of the Government, 'be a formal board or a standing committee for local and municipal affairs in direct contact with the Government and to be largely drawn from elected members of the Legislative Council.' The views of the Secretary of State are somewhat different, though both these high authorities are agreed that there should be a local Government Board for instruction and guidance. The Secretary of State say in his despatch of the 29th November 1918:—

'Such powers as are possessed and in practice frequently exercised by the local Government Board in England seem to be necessary part of a well administered system of self-government in local areas and I do not consider that the place of such a permanent department can effectively be taken by a Standing Committee of the Legislature. A body such as you contemplate would, I doubt

not, prove very helpful to the local Government and would be analogous to the advisory committee that are often established in this country by the Ministers of departments for the purpose of reference and consultation. That such committees cannot exercise the continuous control and guidance that is required and are merely auxilliary to the permanent establishment of trained officials and experts who form the department and who discharge the duties of supervision and control which by law or statutory rules are assigned to the central authority. The expert inspecting establishment which you suggest might eventually be entertained by the standing committee, would according to the English practice form a permanent department under the Minister, and would report to him and act under his instructions. It would be for him to decide the cases in which and the manner in which he would take the advice of the Standing Committee. I make these remarks because the English practice is the outcome of long experience and in my opinion maintains a necessary distinction between the duties of the permanent executive staff, the individual responsibility of the Minister and the functions of an advisory committee.

RESPONSIBILITY OF THE MINISTER.

The principles laid down in the concluding passage of the despatch I have noted, will, I venture to think, commend themselves to Indian public opinion. There should be the undivided responsibility of the Minister, and no institution should be created calculated in any way to minimize or to reduce it; and it is equally clear that he should be aided by an inspecting and supervising staff who would be subordinate to him but whose responsibility to him in their own spheres must be equally clear and well-defined. In this connection I may perhaps add that it would be expedient to provincialize municipal and district board service in its higher branches above a certain pay. In England, the local Government Board means the Minister, and

he is not assisted by a Board on Standing Committee, unless he chooses to call one to his aid for any special purpose. As the experiment of a popular minister controlling a great department would be altogether new and it is possible that he may not have personal experience of the working of local boards, I would recommend the formation of a Standing Committee purely advisory in its scope and functions to assist him, the Committee consisting of not more than three or four members to be selected by the Minister himself from among the selected members of the Legislative Council. Such a body, if properly chosen, would place him (and he would have the strongest motive to make a wise selection) in possession of first hand knowledge and experience and at the same time his responsibility would remain unaffected as he would be under no obligation to follow their advice. The committee may be further strengthened by two additional members, one representing the Municipalities and the other the district boards of the Province chosen by them. The initiative would remain with the minister, his sense of responsibility would be unimpaired; his schemes of improvement would be bold yet tempered with caution, the result of helpful and well-informed advice, and yet he would be firm in their execution. After a time such an advisory committee may not be needed, but it seems to me to be a desirable safeguard at the start. The existence of such a committee need not interfere with his calling to his aid such other expert advice as he may think necessary.

THE ENGLISH SYSTEM.

The local Government Board in England is vested with large powers of control and supervision. But it is not to be understood that it is autocratic in the exercise of its power. Persuasion rather than compulsion is the chief weapon in its armoury, and persuasion having behind it substantial authority which may at any moment be called into operation is usually found to be effective.

Public opinion plays a prominent part in the working of the entire machinery of local self-Government in England, and I feel that with the transfer of the departments to popular control, with a minister responsible to the Legislature and with a sense of growing power in the electorate, popular opinion will within a reasonable distance of time become a powerful and inspiring factor in determining the administration of our system of local self-government. I have no fears as to the autocracy for a local Government Board. For, the board will mean the popular minister responsible to the Legislature and amenable to its control and in the last resort to that of the electorate.

The efficiency of an administration, local or provincial, largely depends upon its funds and much of the usefulness of local bodies and of their capacity to cope with their legitimate work will be determined by the measure of their financial resources. Lord Morley in his despatch of the 27th November 1908, to which I have already referred says, in regard to this aspect of the question, that funds have not existed for an efficient executive staff. The friends of local Self-Government in India from Mr. Gokhale downwards have all deplored the inadequacy of the resources available to the local bodies. In England the local bodies possess unrestricted powers of taxation of which considerable use is made. But it is idle to think of local bodies in India emulating the local authorities in England in this respect. With our growing wants and with the pressure of public opinion to meet them the rate of local taxation will rise; but even then a large margin of local wants will have to be supplied from resources other than local. In England substantial grants are made by the State to local authorities for what are called semi-national services such as primary education, tuberculosis, child-welfare, housing, etc. Here is an extract from an Essay by Captain C. M. Lloyd on constitutional problems which

appears in the local Government Series No. 1, page 40:—

'But modern economic changes and the development of public opinion have led in the last few years to a rapid growth of the grants-in-aid, especially on the national or 'semi-national' services. By the year 1916, the total subventions from the national exchequer to the local authorities in England and Wales (which in 1870, was under £2,000,000, and in 1900 about £10,000,000) amounted to £23,160,815. And the sum, of course, has continued and will continue to arise with the recent extension of the principle in the sphere of public health, *e.g.*, grants-in-aid of clinics, maternity services, treatment of tuberculosis and venereal disease and the large subsidies promised in respect of housing in the near future. The bulk of these subventions, it is important to notice, do not pass through the local Taxation Account but are 'monies voted annually by Parliament,' and these represent a reaction against the Goschen System, and a return to the old plea of direct grants. Of the £23,160,815 mentioned above only about eight and a half millions come from the local Taxation Account, and the proportion of the direct grants is steadily increasing.'

PARLIAMENTARY GRANTS TO LOCAL BOARDS.

The above demonstrates the growing tendency of parliament to make grants to the local bodies out of State funds in aid of sound national services. The volume of these grants has steadily grown from year to year. Water-works, drainage, primary education, anti-malarial measures, and such as may be adopted for the prevention and eradication of cholera and plague and others which might be named should be regarded as semi-national service in the English sense. I strongly recommend that the Government should follow the English example in this respect and assist the local bodies with their subsidies. Something has been done in this respect by

making over to local bodies the proceeds of the Public Works Cess, but the policy is one that in view of our growing local wants is capable of considerable expansion. In the Provincial Budget a fixed allotment should be provided for subsidies to local bodies and also provision should be made for loans to be advanced to them.

CONTROL OF PRIMARY AND SECONDARY EDUCATION.

There is only another matter to which I desire to refer in this Report. In England primary and even secondary education are controlled by the local authorities subject to the supervision and control of an Education Board, presided over by a Minister responsible to Parliament. The local authorities may appoint the teachers, lay down the curricula and generally control the administration of details but they must follow the policy and the programme laid down by the Board. In Bengal primary and in some cases even secondary schools are maintained by grants made from the local funds; but the local bodies have little or no control over them. They are managed by school committees controlled by the Government Department. This is in violation of the elementary principle that where there is financial contribution it must be accompanied by administrative control. But what is more important from the practical point of view is that the control of the local bodies conversant with local conditions and inspired by local patriotism would add to the efficiency of these schools and in the end promote the general interest of education. This is the case in England as I have been told by high authority and there is no reason why the same result should not follow in India from the operation of similar conditions. Next to religion, education is our most sacred concern; and nothing would afford a more powerful impetus to the development of local public spirit than this new sphere of public duty; and the awakened public life of the

locality would re-act upon the entire range of local concerns and exercise a bracing influence over them all. Increased expenditure would be cheerfully acquiesced in and local resources would gladly respond to the new local demand. Increased power would foster responsibility and stimulate the spirit of sacrifice to meet it. English rate-payers are wealthy, but the readiness and spontaneity of their local efforts have their roots in the consciousness of the possession of power and responsibility. I recommend the adoption of the English system, subject to variations dependent upon differences in local conditions. The recommendation of the Calcutta University Commission for the creation of a Board to control secondary education need not interfere with the suggestion which I have made. The Board will be in the position of the Education Board in England, and subject to the general control which it may exercise and the policy which it may lay down, the details of administration in connection with the secondary schools may be left to the local bodies. If indeed it should be deemed inexpedient to start a new experiment in secondary education such as is recommended by the University Commission with a large measure of power vested in local bodies unused to educational problems of this character and magnitude, the school classes below the high schools may be made over to the control of the local bodies.

EXTENSION OF THE SYSTEM TO OTHER PROVINCES.

I consider it desirable to adopt the above features in the system of local self-Government in Bengal and as I was the only Indian member of the committee I may perhaps be permitted to suggest that their applicability to the other Provinces of India should also be considered.

PROGRESS OF AGRICULTURAL LEGISLATION.

BY THE EDITOR.

THE Institute of International Agriculture in its *Annual* for 1918, which has just come into our hands, has as usual an interesting review of Agricultural Legislation undertaken in the countries affiliated to the Institute in the world. The text of the various laws and orders passed is published in French, while a brief introduction in English draws attention to their more important features. It is to some of these that we propose to draw the attention of our readers. As in the past year, we will only touch on those aspects of foreign agricultural legislation as are likely to interest local readers. First as regards agricultural and trading statistics, a law of the Dominion of Canada, of May 24, 1918, orders the constitution and regulates the organization of the Federal Statistical Bureau. The function of this bureau is to compile and publish statistics referring to the commercial, industrial and agricultural activities and to the conditions of the population of the Dominion. It has the duty, among others, of taking every ten years from 1921 onwards a census of the population and of agriculture. The Bureau must draw up and publish monthly and annual statistical notes as to Canada's home and foreign trade. Decree No. 4634, of July 1918, approves the regulation, for the agricultural statistical departments of Portugal. It is the object of these departments to collect, elaborate and publish data as to the conditions and the development of agricultural and live-stock production and as to the distribution and consumption of the products of agriculture and stock farming under the head of trade in agricultural produce, machinery, etc., we would note a law of the Federation of Australia, of July 26, 1917, provides for the

keeping of corn in elevators. It also orders the appointment of a commission whose task it is to define the several types of elevators, the places in which they are to be built and the tariff of fees for depositing the corn. A Portuguese decree of July 13, 1918, No. 4637, having reference to municipal granaries, rules that these must ensure the country's supply of articles of prime necessity by seconding the Government in purchasing and distributing grain and all the other articles which are, in the opinion of Municipal Councils, important factors for the food-supply of the population. The decree determines the organization and regulates the working of these granaries. A Swiss decree of June 24, 1918, regulates the trade in food substitutes, ruling that they may not be offered for sale without Government authority. A law of British Columbia (Canada) of March 15, 1918, regards the seed trade. It authorizes the Minister of Agriculture to buy seed for distribution to landowners and farmers. To obtain this seed, the farmer or landowner must sign an undertaking to return its equivalent, and this will give the Minister a claim on the grain he grows. A Brazilian decree, of March 6, 1918, grants premiums in the shape of agricultural machinery to farmers and agricultural Syndicates or Co-operative Societies who sowed wheat in the 1918-19 season. The condition essential to obtaining these premiums is that the harvest is not less than 15 hecto litres of wheat per hectare, and that the ripe grain be of a density of not less than 780 grammes per litre. A law of *Nova Scotia* (Canada) of May 9, 1917, grants credit for the making and working of agricultural machinery and implements. Another law of this country, of same date, authorizes the Governor to make grants to municipalities, agricultural societies, or individuals to facilitate their purchase of agricultural machinery. An Italian decree of July 14, 1918, authorizes the Minister of Agriculture to grant tractors and agricultural machinery generally, on receiving payment

from farmers or groups of farmers. Another Italian decree, of February 24, 1918, reserves to the State the power for working directly certain deposits of lignite, mines and quarries specified in the decree, after having expropriated, if necessary, private holders of rights in these.

Coming to financial laws a law of Saskatchewan (Canada), of December 15, 1917, places a tax of one per cent of taxable value on uncultivated land. A Japanese law exempts from payments of the land tax uncultivated land which has been cleared up for cultivation, or on which other works have been executed. A decree of Costa Rica, of December 29, 1917, fixes the tax on money-lender's income at 7 per cent of gross profits. A law of Japan, of March 22, 1918, institutes a tax on War profits, namely 20 per cent of total profits in the case of companies and 15 per cent in the case of individuals. War profits are, according to this law, the difference between average income in time of peace and income in time of war. A decree of the Republic of Honduras, of February 16, 1918, authorizes for a period of five years the importing of agricultural machinery, duty free.

In Connection with vegetable production, we would note first a Belgium decree, of January 25, 1918, which regulates agricultural production by determining the proportion in which the land of farms should be used for growing wheat, potatoes, forage, vegetables, and industrial crops. A Swiss decree of January 15, 1918, concerns provisions for ensuring the development of the production of foodstuffs. With this object it directs that in each canton a cantonal office be instituted for the intensification of agricultural production, and that its mission be the encouragement of every kind of production of foodstuffs, the execution and application of provisions made by the higher authorities, and the supervision of the work of communes, corporations and individuals in the matter of the intensifying agricultural production.

The communes will, in their turn, set up communal offices for the increase of agricultural production, and these will be charged to direct and supervise the execution of the provisions of the federal and cantonal bodies. A decree of the Dutch Indies, of November 27, 1918, contains provisions intended to regulate the growing of sugar-cane. A decree of Brazil, of March 6, 1918, makes provisions aimed at extending forestry. Loans will, with this object, be made to growers who increase the number of square-feet planted with eucalyptus trees and other trees of recognized usefulness. The Government is also empowered to make free grants of land to persons engaging to plant forest trees. A decree of Chile, of May, 6, 1918, makes rules for the sale of saplings from the State forests. A law of Spain, of July 24, 1918, aims at the preservation and development of the country's forest wealth. With this object the law forbids or restricts, as the case may be, the felling of certain kinds of trees, provides against the diseases of forest trees, and sets up in each provincial Capital a Committee for the preservation of forest wealth. A law of California (U.S.A.) of May 24, 1917, enacts measures for the encouragement of the development of fresh fruit production in California. The law also standardizes methods of packing certain kinds of fruit. A Spanish law, of July 24, 1918, orders that all mining concessions granted or to be granted in the future both for potassic salts and for other mineral substances which can be used as chemical manures, must be under State control, as regards both the extraction of the substances and their sale.

Under the head of animal production, we would note first a decree of Brazil, of February 27, 1918, which ensures the protection and encourages the breeding of sheep and goats, especially in that it grants premiums for the importing of animals for breeding purposes. A law of Alberta, of April 5, 1917, aims at encouraging the breeding of live-stock by making loans for the purchase

of blood animals to breeding associations. A decree of Japan, of April 20, 1918, aims at the improvement of flocks. It authorizes the Superintendents of Stations of highly bred sheep to lend rams to traders who apply for them and to breeder's associations and Co-operative Societies, on condition the borrowers dispose of at least five highly bred ewes. A decree of Brazil, of June 5, 1918, forbids (for the duration of the War) the slaughter on any territory of the Republic of cows less than eight years old and suitable for breeding. An Italian decree of July 7, 1918, prohibits similarly the slaughter of horses, asses and mules fit for breeding purposes, and makes rules for the slaughter of fat stock of these species. A French decree of September 20, 1918, sets up an interministerial silk committee, directed to evoke and co-ordinate action for ensuring the French supply of silk-cocoons and of raw and worked silk. An Italian decree, of May 9, 1918, makes rules for the production of and trade in silk-cocoons. A Japanese decree, of May 17, 1918, has the object of encouraging development of silkworm rearing. It grants premiums to growers of mulberry trees and producers of silk-cocoons. Another Japanese decree, of June 17, 1918, provides for fighting silkworm disease. Under legislation dealing with agricultural organization and agricultural education, may be first noted a law of Queensland (Australia), of November 23, 1918, which authorizes the institution and working of State industrial enterprise, subject to the control of a State commercial office. The enterprise is to include breeding stations, sawmills, coal mines, etc. An Italian decree, of May 12, 1918, sets up at Rome a Higher Committee of State Mechanical Cultivation and a depository for the apparatus and school of mechanical cultivation. Another Italian decree, of November 21, 1918, founds a committee of trading information at the Ministry of Industry, Trade and Labour. A French decree, of November 30, 1918, constitutes within the

Ministry of Agriculture a higher Agricultural Implements Committee which is directed to examine and propose measures calculated to ensure the development of the manufacture of agricultural machines and implements and to make known the methods of using them. Another French decree, of January 23, 1918, constitutes within the Academy of Sciences a department commissioned to study the application of Science to industry. A Portuguese decree, of September 14, 1918, makes rules for the organization of itinerant agricultural lectureships, the instruction given to be essentially practical and to take the form of lectures and demonstrations by agricultural experts in rural centres which will serve to spread among the farmers of the different districts a knowledge of the scientific principles on which agricultural processes and technique and breeding should be based.

Under diseases of plants, pests, etc., we would note a Dutch law, of June 1, 1918, which aims at protecting potatoes against diseases to which they are liable. It rules that imported potatoes may not enter the country except through certain specially named customs offices which are able to ensure their healthy condition.

Under agricultural co-operation, insurance and thrift, we would first note a French decree, of February 22, 1918, which institutes within the ministry of Labour and Social Thrift a Committee called the Higher Council of Co-operation and directed to study all questions relevant to the development of the Co-operative movement. A Portuguese decree, of July 9, 1918, makes rules for the constitution and working of joint-stock companies as regards their administration and their purchase of real estate. A law of Guatemala, of April 12, 1918, founds a national bank which will, among other things, encourage agricultural credit. A decree of the Korean Government, of June 7, 1918, institutes the Bank for the Economic Development of Korea. The bank, which

has a capital of 10,000,000 yens, proposes to make amortizable loans secured by mortgages on real estate, loans secured by fishing rights, loans without real security to groups of collectively liable farmers, loans to Co-operative Societies, local currency associations, etc., loans secured by pledged crops, etc. The law authorizes this bank to issue debentures for an amount proportionate to the paid-up capital and to the total sums of the loans made. Methods of controlling the bank in order to ensure the working of its departments, are fixed by the law. A Portuguese decree of July 6, 1918, establishes a system of industrial warehouses authorized to receive certain kinds of produce on deposits, to issue certificates of deposits and securities, to sell deposited merchandise, and to encourage trading relations between Portuguese and foreign producers and traders.

Under the head of rural property and land settlement we would note only a few laws about consideration of holdings. A French law of November 27, 1918, aims at facilitating the consolidation of rural holdings. When on land which may belong to one or more communes, properties not built upon are divided and scattered, consolidation may be undertaken, the parcels being distributed anew so that the farming of the properties to which they belong is improved. Exchanges arising out of a consolidation are made in kind and aim at giving to each landowner a piece of land proportionately equal, as regards extent and quality, to the land he previously held within the area on which the consolidation takes place. The law also prescribes formalities which must be gone through when consolidation is effected, and specifies the legal consequences of consolidation, not omitting those bearing on the charges on the land. A Swiss decree of March 23, 1918, provides that the federal Government may make grants to enable the enterprise of consolidated properties held in parcels, and states what are the formalities this entails. Among other measures relating

to rural property is a French law of November 6, 1918, which amends the law of May 3, 1841, as to expropriation in the public interest. It introduces two innovations into the legislation hitherto in force, expropriation of districts and taxation of a proportion of added value. As regards the former point, the law broadens the conception of public interests as implying a right to expropriation, applying it to lands outside the scope of public works but necessary to ensuring the full usefulness of these and the complete realization of their value. As regards the second point, it prescribes that landowners benefiting by the expropriation must pay a proportion of the increment of value accruing to the real estate.

Finally, under the head of rural hygiene and the protection of crops, plantations and stock, we would note a Brazilian decree of August 16, 1918, which aims at providing a rural prophylactic department of which the essential task will be the fighting of all diseases, whether epidemic or endemic, which are propagated in the country. A decree of Morocco of September 4, 1918, contains provisions for preventing forest fires. From 1st July to 1st October, all dwellings—houses and other buildings in or near forests must be surrounded by wide trenches, so that if a fire occur it may not spread. A Spanish law of June 20, 1918, aims at preventing the free pasturing of bulls and stallions in common lands belonging to societies of rural economy.

The suggestiveness of several of the laws and decrees above referred to is self-evident. They hardly need any comment or criticism at our hands to secure for them the attentive consideration they deserve in this country.

JAPANESE TRADE IN INDIA.*

The most remarkable and significant feature of India's import trade during the war has been the prodigious expansion in imports from Japan. The imports have almost doubled in value each year since 1914-15, and the total value during the year 1918-19 was almost eight times that of 1914-15.

Japan now occupies the second place in India's import and export trade. Her shipments to India in 1918-19 amounted to over 22,000,000L., as compared with 51,000,000L., from the United Kingdom during the same period. In 1913-14 the corresponding values were 3,000,000L., and 78,000,000L. The leading imports, in order of importance, comprise cotton yarn and piecegoods, 47 per cent; silk manufactures, 6 per cent; matches, 4 per cent; iron and steel, hardware, cotton hosiery, brass, bronze, etc.; chemicals; paper; instruments and appliance; tea chests; plants; beer; apparel; woollen manufactures; glassware; machinery; cement; earthenware; haberdashery; manufactures of wood; toys; stationery; toilet requisites, etc., etc.

Before the war, the share of Japan in the import and export trade of India was only $2\frac{1}{2}$ per cent and $7\frac{1}{2}$ per cent respectively, and her manufactures did not come into direct competition with United Kingdom goods. In fact, owing to her heavy purchases of Indian cotton, amounting in value, in 1913-14, to nearly 13,000,000L., there was a very heavy balance of trade against the country, and this was regulated through London. Japanese manufacturers, during the period between the Russo-Japanese War in 1904-5 and the outbreak of hostilities, were mainly engaged in extending their markets in Korea, Manchuria and China, and did not, as a rule, look further afield. The war, however, gave them an

* Appendix to the Report of the Committee on Imperial Preference. The Report itself is published elsewhere in this issue of the Journal.

exceptional opportunity, and they immediately proceeded to extend their connections in India, the Straits Settlements and Dutch East Indies; and later on in the British Dominions, the United States and Europe. The principal Japanese overseas banks, such as the Yokohama Specie Bank, the Bank of Taiwan, and the Sumitomo Bank, opened branches in Calcutta and Bombay. Direct lines of steamers were inaugurated between Japan, India and all parts of the world. Japanese shipping companies established themselves at the Indian ports, and prominent export and import houses, such as the Mitsui Bussan Kaisha and the Japan Cotton Trading Company, opened branches in Calcutta and Bombay and were followed by a number of smaller firms. Numerous commercial missions were despatched to India; but for the most part, they worked privately, and were not accredited to the Government of India. Commercial travellers and inquiry agents came over in large numbers, and are still active throughout India studying bazaar requirements and the productions of competitors, and arranging to match well-known United Kingdom qualities. Meanwhile, every importing merchant in India is flooded with price lists, catalogues, market reports, and offers from exporters in Kobe, Osaka, Yokohama and Tokio. Japanese retail stores are now noticeable in every fair-sized town in India, and individual Japanese are to be found in the most remote parts of India. The extension of Japanese activity may be measured to some extent by the fact that the last Census returns show that *in 1911 there were only 32 male Japanese in the country. Their number to-day must considerably exceed 2,000.* There is no properly accredited official commercial agent or attache in India and the Japanese consulates are supposed to attend to all official commercial work.

Not only are Japanese goods entering the country in large quantities, but Japanese merchant houses are taking up a prominent position as general distributors of imports from all

over the world, and as shippers of Indian produce. For instance, during the past two years, two Japanese firms have headed the list of importers of cotton piecegoods into Calcutta; and, although the bulk of these goods were made in Japan, the imports from Manchester of one of the firms have been on a considerable scale. In exports, also, Japanese merchants are invading the trade in each article and are shipping Indian produce all over the world. In fact, during recent months, one firm has been among the first five leading shippers, and four others are shipping large quantities of hessian cloth and gunny bags, Calcutta's staple trade. In the industrial sphere, Japan has been active. Ginning and pressing plants have been acquired in the cotton districts. Efforts have been made to secure jute mills on the Hooghly, but so far without success. There is ample evidence to show that Japan is very much alive to the prospects of industrial expansion in the country.

Before the war, Japanese shipping activities were mainly restricted to the carriage of goods between India and Japan, together with such subsidiary services—e.g., with the Straits and China and between Calcutta and Rangoon—as could conveniently be worked in support of the main traffic. High freights and the shortage of other tonnage, particularly during the last two years, have given to Japan, perhaps, the most lucrative of all the opportunities that the war has brought her. The following are some of the more important regular sailings from India and Ceylon that have been established since the war:—(a) By the Nippon Yusen Kaisha: From Calcutta to New York, Boston and Philadelphia, to the Cape, to Seattle, to Java, and from Colombo to Boston and New York. (b) By the Osaka Shosen Kaisha: From Calcutta to Java, and (with transshipment at Singapore) to the Cape and South America. From Colombo to Japan and Bombay, and from Bombay to Marseilles and Genoa. (c) By

the Yamashita Kisen Kaisha: From Colombo to the Pacific Coast.

Numerous efforts have also been made to obtain a footing in the trade between India and ports in the Persian Gulf, but these so far have not been successful. In addition to these regular services, numerous Japanese vessels have been employed on time charters in Indian waters.

It will be observed that with the exception of the Osaka Shosen Kaisha line between Bombay, Genoa and Marseilles (which was only established in the summer of 1918, at a time when the Suez Canal ports were so blocked with transshipment cargo, dumped there by Japanese vessels which refused to enter the Mediterranean, that it was a question of running the vessels right through or relinquishing all attempts to obtain a hold on the trade with Continental ports), none of the new Japanese services mentioned has involved the running of vessels in a danger area. Japan has, therefore, been able to preserve her fleet intact and extend her shipping services in waters free from submarines, and this at a time when every available vessel was required by the Allies in Europe to maintain their supplies.

One of the most remarkable features of Japanese organization is the way in which all their branches of activity abroad pull together as one unit for the furtherance of the national cause and, by means of preferential treatment to their own people *vis-a-vis* foreign competitors, contrive to place business in the hands of each other and keep out competing interests. In this connection I would instance the connections between Japanese bank and merchants, the co-operation of the Japanese shipping companies with their merchant shippers, and the measures taken by the Imperial Japanese Government to stimulate every branch and to further their industrial and commercial interests overseas. In a word, the foreign policy of Japan is primarily a forward and active commercial policy. This

cohesion and co-operation of all interest for the general welfare is carried to a degree which is not experienced in the case of any other nation. Even commercial Germany before the war does not appear to have been so closely knit as Japan is at the present time. Where such patriotic combination of interests is carried out openly and frankly it is a most legitimate and laudable form of activity and might, with advantage, be followed by many British firms and institutions. There is always a danger, however, that such institutions as banks and shipping companies may be tempted to use their fiduciary position for the advantage of their own people and at the expense of other interests. Similarly, the quite legitimate desire to further the business of one's own compatriots very easily develops into a system whereby unfair preference is given to the detriment of other foreign firms.

Japanese competition may be summarized under two heads:—(a) the competition of Japanese manufactured goods with the products of our own industries; and (b) the competition of Japanese merchants with corresponding British houses in India in the distribution of imported goods and in the export trade in Indian produce and manufactures.

(a) Japanese manufacturers have had an opportunity for expansion during the war which is without parallel in industrial history. Although they enjoyed all the privileges of an Ally, they have not suffered any of the handicaps and difficulties which have been experienced by the Allies in Europe. On the contrary, owing to the difficulty of securing supplies from the United Kingdom and other European countries, the whole of the markets to the East were open to Japanese products. Competition was largely eliminated in many articles and, so far as India was concerned, Japanese imports of cotton textiles, metals, machinery and engineering supplies were encouraged in order to meet the great shortage. Although Japanese shipments have

increased in value nearly eightfold, and although Japanese goods are now to be found in every bazaar in the country, *the general impression is that Japan has not made the most of an unique opportunity.* Complaints are heard on all sides that although the first shipments against orders are usually a fair tender, succeeding shipments are below the quality of the basis sample. Importers also state that they have had endless trouble owing to late shipments, failure to comply with packing, marking or shipping instructions, mistakes in drafts and documents, late arrival of documents, failure to answer business letters, failure on the part of travellers to keep appointments and, generally speaking, most unbusinesslike methods. As a result of these methods and practices Japanese traders and their wares have earned a rather unenviable reputation in the market. During the war, owing to the great scarcity of goods and the consequent high profits made by importers, questions of quality and method of trading were not so important, and merchants merely grumbled and accepted the goods *faute de mieux*. When normal conditions recur, however, and supplies can be received from elsewhere, these defects are likely to have a most detrimental effect on Japanese trade. I am of opinion that the figures for the year 1918 indicate the high-water mark of Japanese imports into the country for some time, and that during the next few years there will be a considerable decline in the trade.

Japanese imports into the country have very largely consisted of cheap showy articles for the bazaar trade which have replaced German and Austrian goods of similar type. These articles have not, as a rule, competed with British goods, as, even prior to the war, our makers declined to put their works on goods of this nature when they were able to keep their labour well employed on the finer and more lucrative productions. So far as can be ascertained at present, Japan will probably retain this trade after the war, as—owing to heavy taxation and labour

troubles—the cost of production in the Central countries is bound to increase and the articles in question are peculiarly suited to Japanese conditions of industry. These remarks also apply in the case of matches and silk products. Japanese minerals, such as copper, sulphur and brass, will probably continue to be imported in fair quantities, although Australian supplies should prove to be competitive. There is bound to be a considerable decline, however, in such articles as electric cables, wire and accessories; paper, hardware, iron and steel, machinery, cutlery, paints, apparel and haberdashery, beer, tea chests, cement and chemicals. It is to be anticipated that there will be greater competition than was apparent in 1913, but the imports during the past few years have been inflated solely on account of the shutting-off of normal supplies and not on the grounds of better quality or more economical production in Japan; so that British makers, provided their prices are not exorbitant, should regain their position in these trades. One point should be mentioned with regard to the imports from Japan of iron and steel, machinery and hardware during the early years of war. In many cases the goods were manufactured in the United States and imported from export merchants in Japan. There was often no indication to show that they were American goods, and consequently Japan received the credit for the manufacture of high-grade articles which subsequent shipments proved that she was unable to supply from her own factories.

It is in Great Britain's staple trade with India, *viz.*, cotton yarns and piecegoods, that the most serious inroads have been made, and that Japanese competition in the future is likely to be most permanent and insistent. In the last year, ending 31st March, 1919, the relative proportions of the quantitative imports

from the two main sources of supply were as follows :—

Imports.	From the United Kingdom. Percentage.	From Japan. Percentage.
Cotton yarns	25.2	71.6
Cotton piecegoods— ...		
Unbleached	64.3	35.5
Bleached	95.9	3.7
Coloured, printed or dyed	88.5	9.2

Japanese yarn imports into India during that year were valued at 3,553,000*l.* and piecegoods at 7,097,000*l.*, as compared with 82,000*l.* and 192,000*l.* in 1914-15, showing an increase of no less than 4,200 and 3,600 per cent respectively.

It is not only the increased quantities, but the wider range of articles shipped, which is important. The entry of Japanese bleached, dyed, printed and coloured woven goods into the market on a fair scale is an earnest of the competition which may be felt in later years when the extensions to the machinery and plant in Japan, now either planned or in execution, become operative.

It is noteworthy that the complaints from Indian dealers in textiles with regard to the inferiority of Japanese shipments are not so frequent as those from importers in other trades. There is apparently much greater regularity and conformity to basis sample in piecegoods shipments than in other articles. This is probably due to the fact that the cotton industry in Japan has been a well-organized factory industry for some time, and the whole of an order would normally be executed by one mill, whereas in other goods, owing to the prevalence even to-day of cottage industry work, shipments against an order are probably collected from a dozen or more different small makers. Moreover, Japanese spinning and weaving companies are large and powerful concerns with ample capital, and their interests are carefully fostered by a strong and representative millowners' association. Although there is considerable

direct trade between export shipping merchants in Osaka and Indian importers, the bulk of the imports are consigned to the Indian branches of two large Japanese houses, the Mitsui Bussan Kaisha and the Nippon Menkwa Kabushiki Kaisha (Japan Cotton Trading Company), who have to consider their own reputation in the local market.

The future trend of exchange is likely to have a considerable influence on Japanese competition. The recent advance in the sterling rates of the rupee from 1*s.* 4*d.* to 1*s.* 8*d.** has given the imports from countries on a gold basis, such as the United Kingdom, America and Japan, an advantage of 20 per cent; that is to say, the prices of United Kingdom, American and Japanese goods expressed in rupees are reduced by 20 per cent. Theoretically, the exchange rates on Japan should follow these on London within very close limits. In practice, however, though the telegraphic transfer rate on London has advanced approximately 25 per cent, the telegraphic transfer rate on Japan during the same period only shows an advance of, say, 17 per cent, taking the highest and lowest points reached. At present the telegraphic transfer rate on Japan shows an advance of only 14 per cent compared with 25 per cent on London. The reason that the Japanese Exchange has not responded in the same proportion is that the telegraphic transfer rate between Japan and London has also fluctuated. In January, 1917, it was about 2*s.* 1½*d.* against 2*s.* 3½*d.* at the present time.

More important still, the high exchange operates in precisely the opposite way in the case of exports from India; that is to say, the prices of Indian produce as expressed in the gold currencies of overseas importing countries are raised by the same proportion. Now Japan imports 60 per cent of the raw cotton used by her textile trades from India (28 per cent from the United States, 7 per cent from China and 3 per cent from Egypt), so that

* It has since risen to 2 *s.* 9*d.*

the high prices expressed in gold yen, at which she will have to purchase her raw material, must be reflected by enhanced rates for the manufactured piecegoods. On the whole, therefore, the rise in exchange should not only greatly benefit Lancashire by reducing piecegoods prices in India, but should improve her position *vis-a-vis* Japan, the prices of whose goods will not be reduced in the same proportion.

(b) The competition of Japanese merchants in India, both in the export and import trades, with corresponding British houses is likely to be most severe in future. The Japanese have a very great advantage in the low scale of their working expenses. Assistants and clerks are readily obtained from Japan at very meagre salaries, often little more than half of those paid by European houses. The standard of living of these men is much lower than in the case of a European. They live their own lives in large chummeries and do not mix socially with the outside world, so that they do not incur any of the ordinary expenses of clubs, entertaining, etc., and consequently, spend very little in the country. They do not object to be stationed in remote districts in the mofussil and to live under conditions which would not be tolerated by the British assistant, for pay on which he could not exist. The Japanese are great workers. Those who live abroad have very few interests outside their work, and devote their whole energies to business. Although they cannot be said to be popular in Indian circles, they seem to understand the subtleties of the Indian mind in a way which the European merchant never attempts to do. This may possibly, to some extent, be due to the proficiency they acquire in the language.

Apart from the Bombay mills, Japanese firms are the largest buyers of raw cotton in India, and maintain their own purchasing agents, ginning stations, etc., in the cotton districts. It is extremely likely that, sooner or later, an attempt will be made to utilise this staff and organization, for the direct

distribution and sale of imports to the consumers, this elimination to the present elaborate and ramified system of brokers, dealers and merchants at the ports which greatly enhances the cost of the goods to the consumer. This practice has been adopted by Japanese firms with success in China, although in some ways such a course in India would present greater difficulties.

The Japanese have already made a definite bid for the handling of a large share of the export trade of India. They are shipping very large quantities of jute and jute goods, wheat, oil seeds of all kinds, shellac, etc., and are dealing in practically every article of export with every part of the world. It is only to be expected that, in future, they will utilise their advantages of low operating costs to effect the purchase of these products in a scientific manner and on a large scale by the inauguration of buying agencies and depots in the districts. This is the only really satisfactory manner of working a large produce export trade and it is astonishing that, with the exception of two or three large continental firms, such as Messrs. Ralli Bros., Messrs. Volkart Bros., and Messrs. Louis Dreyfus and Co., this course has not been more widely adopted by the British merchants in India. There is a tendency among many of our British produce firms to take the line of least resistance. The social amenities are pleasanter at the ports, and the necessity of keeping a vigilant eye on conditions, prospects and prices in the producing districts was not apparent in the past. In consequence, they have usually confined their activities to Calcutta, Bombay, Karachi and Madras, and have relied upon their banians and brokers to keep them informed of local conditions up-country. The result is that, speaking generally, the continental firms with their own depots and European travelling agents in the districts are infinitely better informed on crop prospects and can make their own estimates of the market with a reasonable degree of accuracy. The same

scientific methods are now being adopted by the Japanese, and in a very few years' time it is probable that they will have an organization in the mofussil every whit as efficient as any now existing.

The leading Japanese merchant firms in India are large houses, with ample financial resources and good connections throughout the world. There is not a British merchant house in India with the financial backing, political influence, or elaborate organization possessed by the Mitsui Bussan Kaisha, which has a paid-up capital of 8,000,000*l.*, branches all over the world, and such close connections with Government, banking, shipping and industrial institutions in Japan that it may almost be said to be a quasi-official organization. Other Japanese houses in India, though smaller, are still extremely powerful firms, well known throughout the Far East, but apparently not appreciated in this country, because they are only recently established here. I doubt whether the local British merchants even yet realise the formidable nature of the competition they are now called on to meet, which is likely to become even more acute in the near future.

Based on a report by Dr. Weizmann on his return from Palestine, a programme has been drawn up by the Zionist Organization for immediate work in connection with the Hebrew University, the foundation stone of which has been laid on Mount Scopus, Jerusalem. It is proposed to establish in the house of Lady (Gray) Hill on the site: A Physical Research Institute; a Chemical Research Institute; a Micro-Biological Research Institute, in a temporary building to be erected; two lecture rooms; a number of small rooms for lectures, administrations, etc.; and two reading and reference library rooms and a library. A start is to be made with a Hebrew Institute and a general course in arts. The plans for a noble range of buildings with a magnificent dome are now in London, and will shortly be made public.

TRADE RELATIONS BETWEEN ENGLAND AND INDIA.*

BY A. V. RAMANATHAN, B.A.

INDIA has worked out her previous *karma* and is now on the threshold of a new era of reconciliation, emancipation and progress. Her Government will shortly be substantially representative. The people and the Government alike have awakened to a sense of the importance of fostering local industries, and the bitterness of past controversies has been laid at rest by a recognition of India's right to determine her own tariff policy. It is singularly inappropriate that at a time like this, Professor Hamilton of the Calcutta University, should have published under the guise of dispassionate study of facts, a biased work on a highly controversial topic and thereby stirred up the embers of forgotten differences.

The theme of Professor Hamilton's work is the determination of the decree to which English commercial policy was responsible for reducing India from an economical self-sufficing country with a substantial surplus of manufactured and raw products for export, into one entirely dependent on the outside world for her requirements, alike in peace and war. That such a transition has taken place does not admit of controversy. As the Indian Industrial Commission point out, "At a time when the West of Europe, the birthplace of the modern industrial system, was inhabited by uncivilised tribes, India was famous for the wealth of her rulers and for the high artistic skill of her craftsmen. And, even at a much later period, when merchant adventurers from the West made their first appearance in India, the industrial development of this country was, at any rate, not inferior to that of the more advanced European nations."

* By Professor C. J. Hamilton, M.A. Thacker Spink & Co., Calcutta.

But at present to quote the words of Rushbrook Williams in his "India 1917-18," "While India produces nearly all the raw materials necessary for the requirements of a modern community, she is unable to manufacture many of the articles and materials essential alike in peace and war. India is a country rich in raw materials and industrial possibilities, but poor in manufacturing accomplishments."

It is admitted on all hands that this change took place principally and prominently in the later half of the 18th and the first half of the 19th century. The theory with reference to this transition which Professor Hamilton desires to controvert is to quote his own words, as follows:—

"The methods by which this destruction of Indian industry was said to have been carried out were in the main a series of tariff laws excluding, or heavily penalizing, the import of Indian goods into England *while subjecting the Indian manufacturer to the full force of English competition in the home market.* When at a later date, England had adopted free trade she is said to have again crippled the industrial expansion of India by enforcing upon her a free trade policy, and, in particular, by the imposition of an excise duty upon cotton fabrics as the result of which the nascent machine industries of India are thought to have been disabled from competing on equal terms with the rivals of China and Japan."

In addition to these Professor Hamilton singles out also for attack the following statement of Brooks Adams in his "Law of civilization and decay." "Very soon after Plassey, the Bengal plunder began to arrive in London and the effect appears to have been instantaneous for all authorities agreed that the Industrial revolution began with the year 1760."

Professor Hamilton tells us that the above theory results almost entirely upon an one-sided and inaccurate interpretation of economic history and asserts "India was never a

great manufacturing country except in respect of hand spinning and weaving." He proceeds to say that "the loss by India of her export markets and even of her home market was the inevitable result of an unequal fight between the handicraftsmen and the machine product. The high English import duties were neither directed against the Indian cotton manufacturers nor did they play any important part in determining the outcome."

This is the conclusion that he wants us to accept by a study of his book and we may now proceed to examine the materials on which Professor Hamilton builds up his conclusion.

Professor Hamilton rightly divides the period of Indo-English commercial relations into three distinct periods.

(1) 1600 to 1765 being the period of commercial intercourse of an equal basis, during which India was under native rule and the East India Company was mainly a trading body. This period marks also the inception and growth of mercantilism in England, that is "of the policy that the State should legislate on matters of trade with the purpose of controlling private enterprise in the interests of the nation with the three-fold object of (1) protecting the special manufactures of the country, (2) securing a favourable balance of trade as the result of her imports and exports, and (3) extending by all possible means the growth of the mercantile marine."

(2) 1765-1858. This is the period of the growth of Company's sovereignty in India accompanied by a change in the character of the company's trade in its first half and by the extinction of the Company's activities as a trading body and the growth of facilities for unimpeded commerce by English merchants in India in the latter half. This period was marked in England by the industrial revolution and the growth of manufactures accompanied by a rise in customs duties necessitated by the increased expenditure on the Napoleonic wars.

(3) 1858 to the present time. This is the period of free trade alike in England and India and of the direct sovereignty of India by the Imperial crown and Parliament.

Before proceeding further, it is necessary to point out how largely Professor Hamilton draws upon his own imagination in support of his arguments without giving any contemporary evidence in support of the same. Almost at the beginning of his work he says "one of the curious facts concerning early descriptions of India is that the country is constantly spoken of as remarkable for its great wealth while it is no less common to find the extreme poverty of the great masses of people emphasised as its predominant characteristic."

"When India and the East were spoken of as a source of great wealth by the early European traders, it is probable that the chief reason is to be found in the fact that the trade afforded opportunities for exceptional profit to individuals."

We are not aware of any authority for these statements. On the contrary, readers of the works of Early English Administrators in India will constantly find evidence of how contented, happy and prosperous the general population were in those days. The evidence of Buchanan's journals goes also to discount the correctness of Professor Hamilton's assertion.

We need not follow Professor Hamilton through his description of the activities of the Company during the first period or the growth of English commercial policy during the same. During the whole of this period the Company had to pay for what it took from India by means of European goods or money. Though the Company's trade had the benefit of low import duties, there were no other advantages that the European traders had over Indian merchants and manufacturers. Further the interests of the Company lay in increasing the volume of its business and there were no manufactures in England

competing with India. The only principle of English trade policy during this period which affected India adversely was the prohibition of the export of gold from England, but this did not operate much in practice as the Company found that they could not get Indian goods except for cash and consequently got the permission of the English Government to export a limited quantity of silver for their requirements in India. It is worthy of note, however, that even Professor Hamilton has been compelled to give an instance of how when Indian imports were suspected to compete with English industries prompt action was taken even during this period, to subject the imports from India to special heavy duties. He says "Not until the importation into England of unusually large quantity of muslins and calicos did the manufactures of India come into direct competition with the industries of England and not until then did the question arise of restraining the admission of the former in the interests of latter." But the question did arise in respect of these muslins and calicos and with the following result.

"The popular writers of the day began to prophesy disastrous results to the home manufactures. In 1681 the silk weavers of London petitioned the House of Commons against the wear of East Indian Silks and Cottons. In 1697 they became outrageous on the ground that silks and calicos and other Indian manufactures imported by the East India Company were worn by all sorts of people" and though economists like Davenant argued in vain that "trade is in its nature free, finds its own channel and best directeth its own course," an act was passed in 1700 laying *further duties* on wrought silks, muslins and commodities of the East Indies with a view to provide for the more effectively employing of the people by increasing manufactures of this Kingdom. Nor was this all. The act laid down also "that from 1st June, 1701, the wrought silks, Bengalls and stuffs mixed with silk and huba and all

calicos, painted, dyed, printed or stained and which are or shall be imported into this Kingdom *shall not be worn or otherwise used within this Kingdom.*"

The extent to which Professor Hamilton's views are biased will be clear from his attempt to explain away the above restrictions by saying that imports were still permitted for purposes of re-export. Indeed Professor Hamilton's argument in this respect is of a piece only with his claim for India's gratitude on the score that "the net results of England's trading relation with India must have been a very considerable increase in the total export of Indian textile goods" inasmuch as "England brought her a body of energetic traders having at their command a large number of ships." Great philanthropy indeed!

Another argument advanced by Professor Hamilton in vindication of the above restrictions is that they were not isolated examples of discrimination on the part of England but formed part of England's general trade policy from which Irish manufactures also suffered. The retort for such an argument is obvious.

The interest of the question centre wholly round the second period 1765-1858. During this period the Company gradually consolidated its power and established its sovereignty throughout India. As opportunities for trade in India increased, the English people and the Parliament gradually abolished company's monopoly and threw open the Indian trade to private merchants. The consolidation of Company's rule led to the opening up of the country and increase of facilities for the commercial penetration of the interior. Meantime for the first 60 years of this period the Company's trade assumed a forced character for the annual export of Indian goods to England or "the investment" as it came to be called, began to assume the nature of tribute, that is payment without return. During all this period the industrial revolution gradually took place in England and British manufactures developed

while the old mercantilist policy assumed a pronouncedly protectionist form involving not merely a high range of import duties but also prohibition of importation in certain cases and of export of machinery and of emigration of craftsmen.

To quote Professor Hamilton "The period of early British rule is commonly described as the darkest age of Indian economic history. The decay of commerce, the destruction of native industries and the general impoverishment of the people are commonly emphasised as the chief results of the English conquest."

It is in dealing with this period of Indo-English relations that Professor Hamilton's logic is at its worst. He furnishes with facts and figures in support of every line of the summary above given by us. He gives us contemporary evidence of Indian prosperity before 1765, of interference with Indian manufactures by the Company's servants and agents, of the evil effects of the invasion of English agency into the inland trade surreptitiously at first and regularly thereafter of the forced character of the Indian export trade, of protests by contemporary writers of the baneful effects alike of forced exports and the withholding of specie from India in return, and also of the presence of high import duties in England against Indian manufactures and of the prohibitions above referred to. The only point in respect of which he is not prepared to admit that there is contemporary evidence is that there was any export of specie to England during the period by the Company or its servants representing the "Bengal Plunder."

But what is amusing in Professor Hamilton's reasoning is the manner in which he attempts to explain away all the above evidence to avoid the obvious inference which they lead to. To take the above items serially

(I) Indian prosperity before 1765.

We have already remarked how he would have us qualify evidence of Indian prosperity

by showing that the great masses of people were extremely poor and that the value of India's manufactures has been exaggerated. We have also shown already how such a statement is unwarranted and unsubstantiated by any contemporary evidence. We need only quote one contemporary witness here:—

SIR THOMAS MUNROE:—"If a good system of agriculture, *unrivalled manufacturing skill, a capacity to produce whatever can contribute to convenience or luxury*

* * * *

are among the signs which denote a civilised people, then the Hindus are not inferior to the nations of Europe; and if civilisation is to become an article of trade between the two countries, I am convinced this country (England) will gain by the import cargo."

(2) Interference with Indian manufactures by the Company's servants and agents.

The extenuation attempted in this case is as follows:—

"It is not to be supposed that these practices were new in the histories of the country. Monopolies of the harshest character had frequently been established in the days of native rule particularly in the time of Shaistakhan" he nevertheless admits "it is none the less true that the final break-down of Indian Government after Plassey and the transference of authority to the hands of a small body of men scarcely aware of their new responsibility and ignorant of the means to give it effect afforded the opportunity for the force of lawlessness and oppression to appear unrestrained."

Professor Hamilton argues also that the effect of the Company's activities in restraint of trade has been unduly exaggerated by a wrong interpretation of the following orders of the Court of Directors:—

(i) In connection with ensuring that all silk winders should be encouraged to work in the Company's factories and if necessary forced to work there, the Directors ordered as follows:—

"Should this practice (winders working in their homes) through inattention have been suffered to take place again it would be proper to put a stop to it which may now be more effectively done by *absolute prohibition* under severe penalties by the authorities of the Government." (ii) In connection with the difficulty met with by them in getting their investment cheaply enough, the Directors ordered "finding it our indispensable duty to strike at the root of an evil which has been so severely left by the Company and which can no longer be supported, we hereby direct that all persons whatever in the company's service or *under our protection* be *absolutely prohibited* by public advertisement from trading in any of those articles which imposed our investment, directly or indirectly except on account of and for the East India company until their investment is completed."

Professor Hamilton, however, argues that the first order applied only to such winders as had contracted to work in the company's factories but subsequently stayed away from them and that the second order was directed towards preventing the Company's servants from competing with the Company in the purchase of articles forming the "investment" and did not apply to private merchants.

In construing such orders, however, we have to note the significance attached to them by business men and writers of the time, in the ordinary course of their business, and not the meaning that could be read into them by a process of abstract reasoning from a University armchair after the lapse of over a century and a half. As an instance of how this prohibition worked we may quote the following from William Boats, an English merchant writing in 1772. "The winders of raw silk have been treated also with such injustice that instances have been known of their cutting of their thumbs to prevent their being forced to wind silk." "The baneful effects of (the Company's restrictions)

are severely felt by every weaver and manufacturer in the country, every article produced being made a monopoly."

(3) The forced character of Indian export trade.

The Change that came about in the character of Indian trade with England about this period may best be described in the following words of Shore and Wingate.

SHORE.—"The Company are merchants as well as sovereigns of the country. In the capacity they engross its trade whilst in the latter, they appropriate the revenue. The remittance to Europe of revenues made in the commodities of the country are purchased by them.

There is reason to conclude that the benefits (of our rule) are more than counter-balanced by evils inseparable from the system of the remote foreign dominion.

Returns of specie and goods were made through the (trade) channels of Arabs by that of the foreign European Companies and in gold dust for opium from eastward.

But from the year 1765 the reverse has taken place. The Company's trade produces no equivalent returns.

Upon the whole, I have no hesitation in concluding that since the Company's acquisition of the Diwani the current specie of the country has been greatly diminished in quantity, that the old channels of importation by which the drains were formerly replenished and that the necessity of supplying China, Madras and Bombay with money as well as the exportation of it by Europeans to England will continue still further to exhaust the country of its silver."

SIR GEORGE WINGATE:—"With reference to its economical effects on the condition of India, the tribute paid to Great Britain is by far the most objectionable feature in our existing policy. Taxes spent in the country from which they are raised are totally different in their effects from taxes raised in one country and spent in another.

In the former case the taxes collected from the population at large are paid away to the portion of the population engaged in the service of Government through whose expenditure they are again returned to the industrious class. They occasion a different distribution, but no loss of national income. But the case is wholly different when the taxes are not spent in the country from which they are raised. In this case they constitute no mere transfer of a portion of the national income from one set of citizens to another, but an absolute loss and extinction of the whole amount withdrawn from the taxed country. *The whole amount might as well be thrown into the sea.*"

Professor Hamilton while admitting the transference of wealth from India to England without any equivalent return argues that specie did not form any part of such tribute. His main ground for such an assumption is that there is no mention in the Company's records or in the records of English imports of the import of specie from India to England about this period. It would, however, be clear from the quotation given above and other contemporary writings that the transference of specie did take place though surreptitiously. But this is a minor point. The main fact is that Indo-English trade changed from one of free commerce to one of tribute during this period and if England did not get this tribute in the form of specie it got the specie from other countries by selling the material wealth that it took away from India. The net result was a transference of wealth from India to England and even according to Professor Hamilton's admission it amounted to a million and a half a year; though the details given by him total an annual drain of two millions and contemporary evidence places it even slightly higher. The extent to which India was drained can be realised from the following evidence furnished by Professor Hamilton himself of India's gain as the result of normal trade established in another direction:—

"Gradually the tide turned and once more bullion began to flow *on balance* into Bengal at a considerable rate. For the 11 years 1795-1805, treasure was brought into Bengal from America to the value of *three crores seventy three lakhs*. The import of treasure from all sources including China in the same period was eight crores sixty lakhs."

The next statement sought to be controverted in this book before us is that of Brooks Adams quoted in the earlier part of this review. But that is not an isolated sentence. Brooks Adams says also "In themselves inventions are passive many of the most important having lain dormant for centuries waiting for a sufficient store of force to have accumulated to set them working. The store must always take the shape of money and money not hoarded but in motion. The arrival of Bengal Silver not only increased the mass of money but stimulated its movement. The influx of Indian treasure by adding considerably to the nation's cash capital not only increased its stock of energy but added much to its flexibility and the rapidity of its movement." Even Professor Hamilton cannot be wholly unaware of the treasure which reached England from India if not in the form of specie at least in the form of material goods the value of which was retained there. He attempts to controvert the argument of Brooks Adams by saying "As a matter of fact a brief reference to the economic history of the 18th Century will reveal the complete lack of foundation for the view put forward by Brooks Adams which represents the industrial revolution *as commencing suddenly with the year 1760*." He proceeds to state that the inventions of the smelting of iron by means of coal, of the flying shuttle and of the spinning jenny had taken place much earlier than 1760. He has nevertheless to admit that the first weaving mill in England was erected only so late as 1719 and that it was not until 1802 that the new invention ("Power Loom") began to be

established with commercial success. He adds also "during the 18th Century the great advance in English cotton manufacture was confined to spinning and *this took place after 1780*, the first steam spinning mill being started in 1785.

One fails to understand where the defect in Brooks Adams' reasoning steps in.

We now come to the last item, namely the effect of high import duties in England against Indian manufactures. The manner in which Professor Hamilton explains away this factor is two-fold:—

(1) That the tariff was not directed solely against India but was part of the general commercial and industrial policy of England. Quite so. The succession of the United States and the Irish question are also the fruits of that policy.

(2) "All that the additional import duties can have effect was to have slightly hastening the day when both the East India Company and the private merchants recognised that the import of Indian cottons could not be profitably continued. No impartial student can find in the tariff a sufficient explanation either for the successful development of English cotton industry or for the loss of the English market to the cotton weavers of India. Even if the tariff afforded some assistance to the English producers in establishing a footing in the home market it could not have explained their successful entry into the market abroad."

All this may be perfectly true. That the English industries profited to a considerable extent by the policy of protection is, however, borne out considerably by contemporary evidence. For example when the Company ceased to be a commercial body and began to take a greater interest in the trades and manufactures of India they petitioned Parliament on the 11th February, 1840, for the removal of invidious duties which discouraged and repressed Indian industries.

A select committee of the House of Commons was appointed to report on the petition and the evidence of British manufacturers before that body gave ample testimony to the extent to which they relied upon the policy of protection for the success of their manufactures. Arnold Tonybee also says in his "Industrial Revolution of the 18th Century in England" as follows :—

"English industries would not have advanced so rapidly without a protection but the system once established led to perpetual wrangling on the part of rival industries and sacrificed India and the colonies to our great manufactures." This, however, is not our main concern. The burden of Indian criticism has all along been directed *towards the policy of increasing freedom of trade in India simultaneously with increasing protectionist duties in England.* The combined effect of these two policies will be evident from the following extracts of the contemporary writers."

"Montgomery Martin 1837. Under the pretence of free trade, England has compelled India to receive the products of the steam mills of Lancashire at mere nominal duties while the hand-wrought manufactures of Bengal and Bihar beautiful in fabric and durable in wear have had heavy, almost prohibitive duties imposed on their importation into England."

J. C. Melvill 1840. "I have no doubt that great distress was the consequence in the first instance of the interference of British manufactures with those of India."

William Larpent 1840. "I submit on principle that India ought to be admitted as one of our own possessions. The argument has been used that while our manufactures are allowed to go into India at a very reduced duty we ought to have admitted theirs on as low a duty as possible. There is no colony of this country whose manufactures are of a magnitude similar to that of

India and calling for such treatment. *We have destroyed the manufactures of India."*

On being asked whether it would not be more desirable perhaps that India should produce the raw material and England show its skill in perfecting it Mr. Larpent said, "the course of things in India is decidedly leading to that, but I submit that as this, (silk manufacture) is the last of the *expiring manufactures* of India, the only one, where there is a chance of inducing the native manufactures at least let it have a fair chance and not be oppressed with the duty of 20 per cent in favour of the British manufactures."

Montgomery Martin, 1840. "I have examined at considerable length and for a series of years the trade of India, and I have been impressed with the conviction that India has suffered most unjustly in her trade not merely with England *but with all other countries*, by reason of the outcry for free trade on the part of England without permitting to India a free trade herself. If the cotton manufactures of England are only to be retained at the expense of injustice to India my answer is that England ought to add with justice, no matter what the result may be, that she has no right to destroy the people of a country which she has conquered, for the benefit of herself, for the mere sake of upholding any isolated portion of the community at home. *I do not agree that India is 'an agricultural country. India is as much a manufacturing country as agricultural* and he who would seek to reduce her to the position of an agricultural country seeks to lower her in the scale of civilization. To reduce her now to an agricultural country would be an injustice to India."

Says Professor Wilson in his "History of India"

"English manufactures were created by the sacrifice of Indian manufacture. *Had India been independent, she would have*

retaliated. She would have imposed prohibitive duties on British goods and would thus have preserved her own productive industry from annihilation. This act of self-defence was not permitted her, she was at the mercy of the stranger."

We need not labour the point further, the history of the U. S. A., Germany, France and Italy show what Protection could have done for India. Coming now to the third period 1858 to the present time, India has had free trade with England and the trade has run on normal lines, except for the "home charges." This is also the period of direct Parliamentary administration of India. The principle features of this period may be summarised as follows:—

In 1859 India had for the purposes of revenue to levy a high range of customs duties. An important consequence of the new tariff was that the duties of British cotton were double and in some cases quadruple. The Bombay Importers declared that they could not under the new tariff meet the competition and the Indian factories in the manufacture of cotton goods. The familiar argument of protecting the Indian consumer in the enjoyment of his cheap cloth resulted in the amendment of the tariff in the very next year by reducing the rate of duty on cotton goods by one half and increasing at the same time the low favourable duty on cotton twist and yarn which had been fixed in the previous year. Indian cotton industry agitated that the raising of the duty on yarn acted as a serious handicap on the raising cotton manufacture of India and the duty was again lowered to its former level in 1861. This led to agitation in favour of reduction of the duty on the finished product also which is again reduced by one half. Indian yarn, however, being continued its preference by being taxed at $3\frac{1}{2}$ per cent *ad valorem* against 5 per cent of finished goods. But the British manufactures were not content and again in the guise of advocating the interests of the Indian consumer urged the

abolition of the duty on cotton cloth. When the Government of India, however, pointed out that the duty was necessary for revenue purposes, the alternative suggestion of imposing an excise duty on Indian muslin products was trotted out. It is a matter of common knowledge how eventually a plausible solution was reached by the abolition of duties on all cotton goods in 1882 in taking the advantage of the considerable surplus revenue that Government had at the time and in obedience to resolutions passed in the House of Commons that "the duties levied upon cotton manufactures imported into India being protective in their nature are contrary to sound commercial policy and ought to be repealed without delay as soon as the financial conditions of India would permit."

It is needless also to revive memories of the controversy that centred round the imposition of an excise duty on Indian piece-goods as the result of an agitation set up by Lancashire when the re-imposition upon import duty on their goods was found necessary in 1894 as the result of the fall in exchange and defects in the Indian Budget. Thanks to the change in the angle of England's vision towards India, this controversy has been set at rest and indeed India has been accorded to some extent a voice in the shaping of her own tariff policy in supersession of the dictum of Lord Salisbury as Secretary of State, that the settlement of such a question rested entirely with the Secretary of State.

The Industrial future of India is now fairly assured and it behoves all sections of His Majesty's subjects, Englishmen and Indian alike, to obey his majesty's behest and conduct themselves with "mutual forbearance" avoiding the rekindling of forgotten controversies.

ECONOMICS IN THE WEST.

After-War Difficulties.

London, 18th March, 1920.—Perhaps the most important event affecting the economic and industrial situation that has occurred since I last wrote is the vote of the Trade Union Congress against "direct action" to "compel" the Government to agree to nationalisation of the coal mines. This adverse vote against the favourite principle of the Labour extremists—our "Bolshies" as they are not inaptly described by the popular voice—is not only remarkable in itself but it is notable for the decision with which it was given. The votes were in about the proportion of three to one against—a quite extraordinary weighing down of the scale against the firebrands. The *Times* describes the episode as the turning point in the after-war difficulties. In that view the bulk of careful students of popular opinion will be disposed to agree. The voice of reason is now being listened to where a few months since it was scoffed at. The working classes are more and more getting to understand that violence and intimidation will not advance their cause, but rather will in the long run deprive them of advantages which they have gained by generations of strenuous agitation. It is true that the miners are still aggressive hoping by impossible demands for increased wages to obtain the ends they previously sought by "direct action." But the last word has not yet been said on their impudent claims and it is significant that at a popular Trafalgar Square demonstration on Saturday they were denounced in set terms by speakers with the enthusiastic approval of the crowd.

It is no small thing that there should be at this juncture a greater disposition to peace in the industrial world. Not from one part of the globe but from practically

every well-known commercial centre comes the cry for British goods. Customers in some cases are prepared to pay almost any price for certain lines of goods of which they have a shortage. Especially is this the case in regard to textiles—woollen and cotton goods—which are required in such quantities as to keep the looms of the Northern factories occupied to their greatest capacity. The result of this phenomenal prosperity in industry is neglected in the financial columns of the daily press which are crowded with applications for new capital. It is said, and I believe with truth, that last week's new issues totalled a sum in excess of the aggregate of any busy week in the year before the war. This rush for money is a natural and for the most part healthy outcome of the period of reconstruction; but I am afraid that a good many investors will loom their fingers badly if they do not carefully discriminate between the enterprises that are figuring in the market for new capital. Most of the applications are based on the returns of profits of the last few years when conditions were altogether abnormal. How certain it is that when the post war demands have been satisfied there will be a reaction which will shake the position of not a few of these at present highly prosperous concerns.

BRITISH INDUSTRIES FAIRS.

Optimism, however, is a note which may justifiably be sounded by British manufacturers quite apart from the extraordinary prosperity of special industries. There is now a spirit abroad in the country which makes for confidence—a healthy, invigorating tendency certain to carry us far in the race now proceeding for commercial predominance. No one could have visited the British Industries Fairs recently held under official auspices in London, and at Glasgow and Birmingham without being most deeply impressed with the evidences that he saw all round him of the stirring of new forces in the realms of industry. The old happy go

lucky, hit or miss methods so long characteristic of large sections of our manufacturers were pleasingly absent. In their place were found a keenness and resourcefulness and above all an originality most welcome to all who realise that we are standing on the threshold of an epoch which may be as fruitful for British trade as that which was opened by the peace following the Napoleonic Wars. If the spirit is maintained there can, any way, be no doubt that we shall recover most of our lost markets and capture the business of a good many places to which before the war we could not find access.

It would be impossible to enumerate a tithe of the articles which were displayed on the stalls at these recent exhibitions. But it was not merely the enormous range of our manufactures which struck one: it was the great and successful effort that is being made to occupy ground which was once the special preserve of Germany. In the past few years vast industries have been created, a direct outcome of the national determination to be no longer dependent on foreign sources for vital articles. Dyes, of course, are a conspicuous case in point. The British industry is now producing enormous quantities of dyestuffs in ranges of colour which before the war would have secured quite beyond the capacity of the British manufacturer. It still has a good deal to accomplish before it fully occupies the position held by Germany in earlier years. But there is an excellent guarantee in what it has already done that it will not disappoint the sanguine expectations of its future entertained when the movement for establishing a British dye system was started. The British Glass Industry is another interest which is showing very well in this after-war period. The old story of British dependence on enemy countries for glass and especially for optical glass, need not be re-told. Of all the unsatisfactory minor chapters in the war none was more humiliating than that which

revealed the difficulties in connection with gun sights and optical instruments because we could not manufacture them. Now the conditions are so entirely different from what they were as to constitute a revolution in this particular trade. In pre-war days reliance was largely placed on hand labour. In the last few years machinery has been installed almost everywhere in the glass trade with the result that the output has been enormously increased and with it the possibilities of a permanently lucrative trade. A striking example of what is accomplished by the new methods may be given. A machine employed in the manufacture of lamp glasses turns out in an eight hour shift 24,000 articles. The only labour required to produce this large output is a mechanic and two boys. Under old conditions the services of 180 men and boys were required to manufacture 500,000 articles per week. Glass tumblers, or drinking glasses, by the use of machinery can now be produced at the rate of 30,000 per eight hour shift where in former days with hand labour only 500 per shift were forthcoming. When we turn to the finer class of optical glass we find that equally good progress has been made. Indeed, throughout the whole range of glass making British manufacturers have established themselves in a position which will make it very difficult for foreign competition to gain any new foothold in our home market while British glass will be a formidable rival to foreign made glass abroad. It is well that we should keep these facts before us in making our after-war survey. They help to dispel the unpleasant impression that may be created by incessant labour difficulties and protracted unrest in the industrial sphere.

British toy making has made giant strides since those early days of the war when the door was barred on the once ubiquitous German toy. At the recent exhibitions there was a really remarkable display of toys in an

infinite variety of types and styles of manufacture. They were by no means slavish reproductions of the old familiar German toys, but often quite original productions calculated to appeal to the infantile mind with even greater force than the goods they have displaced. Substantial as the progress made in the domestic toy trade has been there is still ample room for enterprise if the British made article is to fill the void left by the Germans. In this work of building up a British toy trade India might appropriately lend assistance. We import annually tens of thousands of pounds worth of Japanese toys and they are eagerly bought, but so far as I have been able to discover little or nothing in this line comes from India. Yet, surely, your country is admirably adapted for toy making of the class which is popular in the West. You have cheap and intelligent labour, ample supplies, in the hilly regions at least, of suitable material and the right type of genius for the production of such goods. There need be no slavish imitation of European models. Indeed, to be really successful an industry would have to develop a style of its own—one which would be racy of the country and yet appeal to the childlike mind which is much the same the wide world over—differences of race and creed notwithstanding. Perhaps some Indian capitalist will take the matter up. By doing so he would serve Indian interests and at the same time add a new joy to the life of the young whose insatiable demand for something new is a real care to the head of the family when each recurring festival arrives and presents have to be bought for the inmates of the nursery.

SCIENTIFIC AND INDUSTRIAL RESEARCH.

The policy of research followed by the Government during the war is being placed on a permanent footing by the establishment in suitable centres of associations charged with the duty of conducting investigations on a systematic plan. One such body to

safeguard the interests of the non-ferrous metal trades has just been started on its career at Birmingham, the home of the metal industry. The special province of this association will be the whole range of non-ferrous metals, including copper, brass, zinc, aluminium, gold, silver, etc. Its objects are defined as "to arrange for the carrying out of scientific and industrial research and the dissemination among its members of technical and other information relating to the production, treatment, manufacture and uses of non-ferrous metals." The membership of the association will be conferred to British firms and will involve an annual subscription, based upon the capital employed in the business, except where a firm's capital is partly employed in other than non-ferrous metal work in which case the firm's subscription will be specially assessed. The programme of work in contemplation is a comprehensive one. It embraces a wide field of research in all the departments of the special industry with which the association is connected. Power has been taken to encourage the training of expert research workers and to improve the technical education of persons engaged or likely to be engaged in the non-ferrous metal industry. Such admirable results were obtained from the research committees established during the war that it is confidently expected that the association will speedily justify its existence. More and more, indeed, it is becoming evident that it is through such agencies as this association the country's industry will advance to the high position which is marked out for it by the events of this extraordinary period in the world's history.

In referring to research work I must not omit to take note of the remarkable success that has been secured by British manufacturers in the production of photographic materials. In the pre-war period we were almost entirely dependent upon foreign—chiefly German sources—for the necessary

appliances and material for photography. What has been done in the matter of the manufacture of optical glass has already been noted. Similarly satisfactory results have been obtained in regard to chemicals. Thanks to the work of our research chemists, as a writer in *Trade Supplement of the Times* shows, we now have British amidol, British metol and British hydro-quinone, and all three chemicals are quite equal to the German quality. Metol and amidol are being produced in commercial quantities and are being exported to overseas dominions, the United States and many foreign countries. Hydro-quinone will follow as soon as the erection of the necessary plant permits of it. In regard to cameras the experience gained during the war in the manufacture of aeroplane cameras in great numbers by the British Camera Factories is being turned to good account and helped by mass production of an intelligent kind these establishments are putting upon the world's markets great numbers of popular folding and pocket cameras. The greatest triumph achieved by the British manufacturers, however, has been in the production of dry plates and sensitized paper. A speciality is a colour sensitive plate used with remarkable effect during the war by our aviators to photograph the features of the country. This plate, which rendered the art of camouflage useless in many cases because objects were revealed in their true character in spite of disguise, is most valuable in certain classes of photography and undoubtedly has a great future. Roll film of a quality which will compare favourably with that made in any other country is also being produced, and supplied in ever increasing quantities to customers abroad. In fine, the British photographic material industry is in a stonger position than it has ever before been in its history and the time seems to be coming when it will be pre-eminent in its own line.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

Shooting Concrete into Place by Steam.

Washington, D.C., U.S.A., Feb. 26, 1920.—

"Look at this," said the manager of an electric railway company in an eastern American city to a widely known structural engineer in the spring of 1912. This engineer, in talking with the writer a few days ago, said:

"He pointed to the reinforced concrete columns, girders, and beams of a large packing house. From cellar to garret, wide cracks followed the lines of the buried steel.

"Near the packing house was a railway power plant, and the packers thought this was the source of trouble. But with suitable electrical instruments I demonstrated beyond a doubt that it was caused by electricity that had leaked from the circuits of the packing house.

"Can you put the building into a safe condition electrically, and repair the damaged concrete?' the packers asked me.

"As an electrical and structural engineer, I felt that I could solve the first problem. But I knew nothing about concrete! Experts assured me that the repairs could be made with a machine that blew a stream of dry cement and dry sand into a jet of water. In accordance with their advice, I undertook the contract of repairing the concrete after installing the electrical protective apparatus.

"The cement-shooting machine worked well enough, but some of the fine, dry cement that escaped from the cone of the water jet rained down upon everything within a radius of eighty feet.

"You will ruin our meat,' said the packers. The government inspectors agreed with them, and ordered me to stop.

"What was I to do? After a search, I found a machine for which it was claimed

that it would blow a wet mixture of cement and lime and make it stick. I tried the apparatus. It failed ignominiously. I sent for the inventor of the apparatus. After spending several miserable hours in the dripping wet cooling room of the packing house, he delivered himself thus:

"Any man who tries to place new concrete on the lower edge of an old concrete beam is a fool. But any man who tries to do this in a room where the temperature is below freezing is crazy. It cannot be done."

"But I had meanwhile been using pneumatic hammers to chip away cracked concrete four inches thick on three thousand lineal feet of beams and girders. All the lower reinforcing rods of that concrete were exposed to salt water. The building seemed doomed; also my professional reputation. I decided that I would have to design my own apparatus."

"With a motor, frame and hopper I built up a crude device that worked fairly well with compressed air. A few tests showed that the jetted concrete would hold. But why not heat the air? I made the attempt. The results were excellent in rooms where the temperature was below freezing. Engineers all over the country became interested in the work. I received orders for a number of similar machines."

"In two weeks I had the first concrete atomizer. Two machines were built and sold at once."

"Since that time I have repaired the honey-combed structure of the Lackawanna Railway terminal at Hoboken, N. J., patched the first concrete barge built in this country after it proved to be too badly honey-combed for service, and kept myself busy shooting concrete."

"At first I used compressed air. Later I became convinced that steam would give better results at a less cost."

"It cannot be done," said the engineers

once more. 'The cold concrete will condense the steam.'

"I obtained the use of a railway switch engine for my steam plant. In order to superheat the steam and control its temperature I arranged a coil of pipe in a coke fire. From seven in the morning we worked all one June day, without stopping to eat. No success."

"At five o'clock I mixed a final load of one part cement, three of sand and two of fine pebbles with about 15 per cent of water and with steam at 300° F. A perfect stream shot out, spread evenly, and adhered to the steel work it was to cover. The next morning there was a flint-like surface better and stronger than the air-jetted concrete around it."

"That was the beginning of much railway concrete work. When I was asked by the Chicago and Great Western Railway to reline its great tunnel at Winston, Ills., I tackled my most difficult job. Over the track center the entire lower course of brick had been worn away by the combined action of the locomotive exhaust and of streams of water that seeped through under heavy pressure. Since it is physically impossible for a man to hold a two and one-half inch nozzle shooting a stream of hot concrete directly over his head a designed and placed on a flat car a motor-driven rock shaft located at the arch center, to which a flexible nozzle-holder was attached. This was mounted on a carriage, so as to be moved ten feet forward and backward by means of a hand winch, and it also swung to and from a spring-trowel device. This invention did away with hand mason work in finishing the surface. An adjoining flat car carried the atomizer and necessary materials."

"I have since worked out a modification of the nozzle car and trowel machine for making concrete roads with an upper surface that will wear as well as granite."

"Thus what seemed an overwhelming failure resulted in the invention of a new

labor-saving apparatus, new building materials, and new methods of construction."

AT LAST MOTION PICTURES THAT TALK

Hundreds of our most eminent and successful motion picture producers and inventors have been working their "thought tanks" overtime morning, noon and night trying to produce real, honest-to-goodness movies that would talk *at the right time*, with the right accentuation, and never get out of step or synchronism.

It is comparatively easy in cartoon and other movie drawings to show the words issuing from the mouths of the actors, but when living actors are employed there has not been heretofore any method whereby the words could be shown in the scene directly, although several talking machine schemes have been tried out, including that of Thomas A. Edison, the famous inventor, a short while ago. As is well known, in the talking machine scheme the speeches of the actors are "canned" simultaneously with the photographing of the various scenes, and afterward the talking machine record is run off simultaneously and synchronously with the projection of the motion picture. For several reasons this has not been entirely satisfactory, and after having demonstrated this arrangement a few years ago there has not been any presentation of the talking phonographic movie in some years.

Now an invention has been made by which the actors fairly spit out their words to portray their sayings, dialogue and conversation, and this is accomplished in the simplest manner imaginable. The letters are printed on a collapsible and transparent celluloid strip which can be extended or contracted by pressing or releasing a pneumatic bulb held in the coat pocket or in the hand, and the actor, or actress, is thus enabled to actually "speak their thoughts."

The method of accomplishing these results consists in causing a selected arrangement of letters which will spell the spoken

words to appear from behind the actor, preferably from behind his head, in line with or substantially beside his mouth, while the photographing is proceeding, in order to produce that portion of the photoplay which is to be emphasized by such words or sentences.

Regarding the celluloid strip on which the letters or words are printed, this is made transparent so that the end toward the camera will not unduly contrast with the color of the actor's hair, or otherwise this strip may be colored or made to match his or her hair. The collapsible strip bearing the letters is fitted to flexible tube leading to an air bulb or bellows which may be operated by the hand or else located under the arm of the actor. When the pressure of air is created by squeezing the bellows or bulb, the quick-acting coiled tube is inflated and out pops the word or words in line with, and apparently from, the actor's mouth. As the inventor points out, even those in the audience who are experts on lip-reading will find this system to be synchronous and very natural in its presentation, as the actor can actually pronounce the words and produce the necessary facial and mouth movements as the word appears.

A LONG DISTANCE DICTAGRAPH.

The dictagraph is known to practically everyone to-day, for this wonderful scientific device has figured quite extensively in private and other investigations all over the world.

Plainly described, the dictagraph comprises a super-sensitive telephone which can pick up at a considerable distance from the transmitter ordinary speech sounds, and in some cases even whispers, and transmit them, electrically, over a circuit of considerable length to a pair of telephone receivers. The operative who makes use of the dictagraph, and who invariably has to be a shorthand writer so as to record the incoming conversations, is usually located in the same building and in some cases in the room or

apartment adjoining that in which the criminals or conspirators are located.

The dictagraph telephone circuit includes a battery, a pair of low-resistance telephone receivers wound to about four ohms each, so as to permit a fairly heavy current to pass through the circuit, and a very sensitive carbon-grain microphone.

A New York engineer has recently suggested a combination of the wireless telephone and the dictagraph, by which means the application and versatility of the dictagraph is increased many-fold.

In a building where the suspected persons have their rendezvous or living quarters, there is installed the usual super-sensitive microphone of the dictagraph outfit. This is sometimes hidden behind pictures, under tables, or other furniture, and in some cases it has been placed in the drawer of a side-board or china closet. The wires are scrupulously concealed and installed by the detectives investigating the case, at some time when the occupants of the apartment are absent. The speech waves picked up by the microphone are transmitted to the receiver of the loud-speaking receiver of the instrument, which is secured in close relationship to the microphone of an automatic wireless telephone transmitter, preferably of the noiseless vacuum or audion type.

This latter apparatus is carefully installed in some out-of-the-way location where it is not likely to be found, and no attendant is required to stay and watch the apparatus, once it is set in action. This releases the usual dictagraph attendant for more important service. Any conversations picked up by the wireless telephone dictagraph are thus amplified and transmitted in the form of Hertzian waves from the concealed antenna whence they are picked up by the antenna of the radio receiving station located at police or detective head-quarters. Here they are transmitted into articulate speech once more, through the wireless telephone

receiving apparatus, all in a well known manner.

The receiving set can be of the audion or vacuum tube type, and, as is the case with all up-to-date radio stations, it may be equipped with a vacuum type amplifier, so that the incoming messages can be intensified until they are thoroughly audible, or they may be recorded independently or simultaneously on a phonograph for further reference and record.

LIFE OF LIBERTY MOTOR 100 FLYING HOURS.

In the opinion of Colonel H. H. Arnold, recognized as one of the most reliable authorities on aviation in the United States, one great result of the recent trans-continental airplane race is the definite knowledge obtained on the actual life of the famous Liberty motor.

"We have never known before that the life would be of a Liberty motor," said Colonel Arnold. "We have never tested them to the utmost of their endurance before. Now we are able to say that the life of a Liberty motor is about one hundred flying hours. We have learned that it is perhaps the best airship engine which has ever been made, but it is not the superengine some of its designers hoped for and claimed. In fact, some of them were hopeful enough to say it would never wear out. This, of course, is a mistake. The development of the new mica spark-plug in the place of those formerly made of porcelain cannot be over-estimated.

"Another important and significant fact learned during the race for the first time is that all parts of the Liberty engine are not interchangeable when the parts are made by different factories. We found that some parts on the engines made by the Ford plant and by the Lincoln plant are not interchangeable, as was demonstrated at Presidio Field, California, when the changes were tried. The assertion that any part of any

Liberty engine could be interchanged with any similar part from any other engine, even though made at a different plant, has been one of the most widely advertised features of the new engine."

HAVE YOU HAD YOUR TEETH X-RAYED?

The dental X-ray machine is one of the newest inventions. It is noiseless, yet it is extremely powerful and rapid, and requires a minimum exposure period.

Relative to the technique of taking dental X-ray pictures, it naturally requires a film or plate behind the portion or parts to be X-rayed, but the advantage claimed for the new machine is in the time and milliamperes required for making an exposure.

Exposures on all machines are figures in milliamperes seconds. This, being arrived at by the time of exposure, multiplied by the milliamperes. In other words, with a meter reading of 25 milliamperes and an exposure of four seconds it would give an exposure of 100 milliamperes seconds. Where other machines operate on anywhere from 50 to 150 milliamperes seconds, this machine operates on from 4 to 8 milliamperes seconds.

The current is turned on and off by foot treadles operating from both sides of the machine.

As to the patient's safety, the low milliamperes-second exposure is the big factor in the machine. According to best X-ray authorities, it takes a minimum of 800 milliamperes seconds directed at the same spot to cause a burn. It is readily seen, then, how much leeway the new invention has over a machine using 100 milliamperes seconds to an exposure, as compared with the 4 milliamperes seconds here required. The lead covering of the tube protects the patient on all parts of the body except just where the rays from the funnel are directed, or in the region of the teeth.

ALFRED T. MARKS.

NOTES.

The Madras publicity Bureau has issued the following:—It is well known that Alizarine dyes were, prior to the war, imported mainly from Germany. In fact, out of 6,469,739 lbs. of Alizarine dyes imported into British India during 1913-14 as much as 4,637,450 lbs. or 73.6 per cent of the total imports came direct from Germany, and 804,243 lbs. (probably of German origin) from Belgium. When war broke out imports from Germany during 1914-15 fell to about half the quantity in 1915-16, and afterwards stopped completely. On the outbreak of the war strenuous attempts were made by the British Alizarine Co. to increase their output but it was not until the early part of 1918 that they were able to send to India any material quantity of dyestuffs; this quantity was, however, unequal to the demand with the result that the retail dealers took advantage of the situation and made enormous profits. About April 1918, advice was received from the British Alizarine Co. that they were shipping to their Agents *viz.* Messrs. Best & Co. 5 tons of Alizarine and that there was a good prospect of regular supplies being received in future. The Board of Trade, however, required Messrs. Best & Co. to certify in respect of each sale that the dye had been sold to a consumer and not to a dealer. To enable them to do this and to keep down the prices to a proper level Messrs. Best & Co. applied to Government for assistance and co-operation. In May 1918, Government sanctioned the introduction of a scheme by which Collectors of districts were asked to constitute local committees to deal with applications for dyes from bonafide dyers. The committees were to consist of two well known dyers of the locality with a Government official of standing as President of the Committee. The applicant for dyes had to make a formal

application and if it was proved that he was a bonafide dyer he would receive a limited supply at a price fixed by the Collector of the District. In the case of Madura alone which is the chief dyeing centre of the Presidency, an exception had to be made. The system of certificates was tried there for some time but had to be given up owing to certain circumstances special to that place. Since October 1919, the distribution of dyes at Madura has been left in the hands of Messrs. Best & Co. The distribution is being made on the lines laid down by Dr. Marsden and in consultation with the Collector of Madura. The system outlined above worked well on the whole though there were occasional complaints to the effect that persons who were not actual dyers were treated as dyers and that bonafide dyers adopted dubious methods to supplement their allotment. As long as supplies were regular there was not much trouble but with the close of the war and subsequent labour unrest and increase in demand elsewhere there was a fall in the supplies and difficulties have again arisen. According to the terms of the Peace Treaty, Germany has to deliver to the Allies a certain quantity of dyestuffs as part of the reparation for the injuries done to the allies nations. Out of the German dyestuffs allotted to the British Empire, arrangements have been made to secure the whole of the reparation alizarine dyes for India in addition to a portion of the other reparation dyes. These supplies will be in addition to supplies which would, in any case, have been sent to India by the British Alizarine Co. The first consignment of German reparation alizarine dyes for Madras has now been received; it amounts to 200 casks of 4 cwts. each; this consignment and future consignments of alizarine dyes expected from this source will also be distributed in accordance with the scheme referred to in para (2) above. The stock that has arrived has been allocated to the various agencies of Messrs. Best & Co. and intimation sent to the Collectors of the

districts. Statements are appended showing the distribution to the agencies and the areas served by each agency. (These are omitted here. Ed., M. E. J.) This distribution is proportionate to the demands in the various areas but is admittedly far below the total demands anywhere. This condition of affairs is due to circumstances beyond the control of the Local Government or Messrs. Best & Co. The British Alizarine Co's. new works at Manchester are expected to be completed by June next and shortly afterwards they expect to be able to supply the total Indian requirements from their factories. Meantime the arrangements detailed above will continue to be in force. Any consumer of dyes who wishes to obtain a supply of these dyes should apply to the local committee or to the Collector, if his name is not already on the Committee's list. In conclusion it may be of interest to the public to know that Messrs. Best & Co. are the Madras Agents of the British Alizarine Co., but the former are not at liberty to charge any price they choose. The Government fix the price per lb. and Messrs. Best & Co. have to sell the dyes at that rate: they are allowed a fixed percentage as commission on the net proceeds after deducting duty and handling charges. The sale price of Alizarine has now been fixed at Rs. 1—3—0 per lb. at any of Messrs. Best & Co's. depots.

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The Madras Publicity Bureau in a leaflet says:—A notification has been published in the Fort St. George Gazette under the Madras Agricultural Pests and Diseases Act, 1919, directing that all Cambodia cotton plants in certain taluks in Salem, Trichopoly and Madura should be pulled out of the ground before the 1st of August in this year in order to eradicate the insect pests pink-boll worm and stem weevil. The circumstances which rendered it necessary to apply the provisions of the Act are as follows:—Cambodia cotton if left in the ground will continue to put forth bolls for a second and

a third year and even a fourth year. Tempted by the high price of cotton many cultivators, especially the more cereless cultivators, have made a practice of leaving Cambodia cotton in the ground expecting to obtain a fair income by harvesting these bolls without the expense and trouble of cultivation. This practice is regrettable in that it fails to secure the fullest use of the land and reduces the area under foodgrains. Further even from the point of view of the ryot seeking an immediate pecuniary profit it threatens rapidly to become ruinous. If cotton stands in the ground for the whole year the pink-boll worm and the stem weevil find a refuge throughout the year and increase and multiply to an incredible extent. In a short time the ravages of these pests becomes so serious that the whole crop is threatened with destruction. The only known method of preventing their multiplication is to see that for a certain number of months of the year there is no cotton on the ground to give them shelter. A single lazy cultivator who decides to leave his cotton standing for a second year in order to save the expense of cultivation may provide a refuge for as many of pests as will suffice to ruin the cotton crops of their more industrious neighbours in half a dozen surrounding villages. It has therefore been considered impossible to leave the annual unrooting of the cotton crop entirely to the will of the individual ryot. Justice to the more industrious cultivator seems to demand that indolent neighbours should be compelled to take the preventions necessary to prevent the spread of these pests. It is for this reason the ryots in Salem, Trichinopoly, Madura and Coimbatore are now to be required to pull up all their Cambodia cotton before the 1st of August yearly. Steps are being taken to make the facts widely known among the villages affected by it.

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Co-operative dairying has been a great success in New Zealand. Dairying now ranks

as New Zealand's third industry in order of importance, wool occupying first place and meat second. The value of exports of dairy produce in 1918-19 was £8,250,000 although this figure is considered to be lower than the market value of the commodities concerned, the prices at which cheese and butter were requisitioned by the Imperial Government being below the prices now prevailing in the open market. The dairy factories registered under the Dairy Industry Act include 159 butter factories and 388 cheese factories, as well as 18 butter and 18 cheese factories privately owned; also 29 factories engaged in the packing and preparation of butter for the New Zealand market, but not making it. An idea of the value of the dairying industry may also be obtained from the fact that in the Province of Taranaki land suitable for dairy farming changes hands at £100 to £130, and £135 to £140 per acre; and that £70, £80, £90, and £100 are stated to be common prices for such land in other parts of North Island. Practically all butter and cheese and dried-milk factories are co-operative concerns, owned and directed by dairy farmers—the suppliers of milk. Eggs are usually sold through egg circles or co-operative distributing agencies. As purchasers of manures, machinery, and other requirements, the farmers have greatly increased their activities. They now purchase groceries, furniture, building, and other materials through their own co-operative associations to the exclusion of the merchant and retailer. The Farmers' Co-operative Wholesale Federation (New Zealand), Ltd. (which has offices in London), now embraces eleven associations and 62 branches of associations. To 30th September last the aggregate authorized capital of these united concerns was £3,215,000, of which £2,123,900 was subscribed and £1,490,662 paid up. The volume of business done in the twelve months then ended was £13,900,000; and merchandise sales amounted to £2,500,000. This co-operative

business includes the marketing of wool, stock, and all other farm produce, and the distribution of everything required by the farmer, from a phonograph to a chain-harrow. The business is growing all the time.

The advisability of introducing small-size agricultural implements for fruit and vine-growers in the East has often been pointed out in these columns, says the *Near East*. Very large fruit farms and gardens and very extensive vineyards in the Near and Middle East are cultivated by hand with a spade of local construction. The special narrow ploughs and diggers which are used in France, and even in this country, for this purpose are unknown there, although the natives throughout the fruit-growing districts of that region would be ready buyers of such implements if they knew them. Why the makers of such implements ignore the very markets in which their products would meet with a great commercial success is inexplicable. Of this we thought again the other day at the recent Implement and Machinery Exhibition at the Agricultural Hall, Islington, when we watched two landowners or merchants from the Levant absorbed for a long time in examining a small fruit-farm plough which was exhibited, and, if we are not mistaken, was subsequently bought by them. The implement was really very interesting: a reversible plough with movable handles and head, either or both of which can be instantly set at any desired angle to allow cultivation to be carried close up to the stems of trees without damaging the branches. There are no projecting parts on the beam, which is specially low down, so that even the branches of bush fruit should be immune from damage when closely ploughed. Moreover, the coulter is attached to the beam in a novel manner, so that no projection appears above the beam. To enable the head to be kept well towards each tree, the draw-bar is taken from the rear of the plough, thus permitting the man and

horse to walk in the centre of the alley. The makers may be sure that, if properly introduced, this plough will find a good sale almost throughout the Near East.

The demand for sheet glass in Japan before the war was about 600,000 boxes (100 square feet each) per year, of which the greater part was imported from Belgium, America ranking second. At that time the Asahi Glass Company was an insignificant native factory; but when the factories in Belgium were destroyed as a result of the war, and the import of American glass also decreased for various reasons, the production of the company practically monopolised the Japanese market, and increased to over 80,000 boxes per year. It was expected that after the conclusion of the Armistice great competition would ensue between native and foreign goods, and that the price would go down as a necessary consequence. As a matter of fact, the market rose instead of dropping. This was due to the following reasons:—(1) That the destroyed factories in Belgium could not be quickly restored, and the cost of production being now much higher than before the war, Belgian goods were not yet in a position to compete with Japanese goods in point of price; (2) that in America, too, the cost of production had risen, and the manufacturers there found it more profitable to export their products to Europe than to Japan, where the high price of their goods made successful competition impracticable; and (3) that the export of glass from Japan to the Far East and Australia increased, as shown in the following table:—

Exports of window glass from Japan in 1919 were:—

		Sq. ft.
January	...	2,515,000
February	...	2,950,000
March	...	2,635,000
April	...	2,288,000
May	...	3,420,000

June	...	...	1,761,000
July	...	...	2,075,000
August	...	...	1,365,000
Total to August, 1919	...	...	19,015,000
Total to August, 1918	...	...	15,883,000

In this way the fear of over-production which was entertained as a result of the considerable increase in the production of the Asahi Glass Company was found premature. On the contrary, the export showed a great increase, and stocks at home decreased so as to fall short of the quantity in demand. Hence the rise of the price to yen 30 per box in August. The situation of the market, however, now threatens to undergo a change. Owing to rumour of arrival of foreign goods, in October, the tone of the market became somewhat weak. The merchandise is now in high demand, and Belgian goods, being quoted at yen 26 or yen 27, delivered ex steamer Kobe, are not in a position to effect Japanese goods, the price of which, however, has fallen to yen 28 or yen 29. But a state of competition will be entered on, and the quotation will fall should the Belgian dealers reduce the price. The authorities of the Asahi Glass Company, however, think that they are able to face the impending competition successfully.

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The use of concrete for building purposes, apart from its very extensive use in public works, has recently been increasing throughout the Near East, the few earthquakes last year having probably given a new impetus to concrete building. There is, however, also a certain amount of hesitation owing to defects which are often noticeable in such constructions, and which are attributed to reasons more or less baseless. The most probable reason, however, in such cases is the bad handling of the concrete through inadequate supervision over inefficient men who are entrusted with the mixing. It is admitted that the mixing of concrete is one of those things which can be done very easily

indeed, but requires a very great deal of care if it is to be done really well. Men who handle concrete habitually are aware of the importance of grading aggregate, sand and cement in such proportions as to give as solid a concrete as possible; and of mixing the components together thoroughly. Professor Abrams, of the Lewis Institute, drew attention to a point which perhaps has not received due consideration, and that is the importance of using the minimum amount of water sufficient to produce a plastic or workable concrete. In fact, he considers that the water proportion has more effect on the nature of the resulting concrete than the proportioning of the other ingredients. His conclusions are based upon some 50,000 tests, and therefore deserve the most serious consideration. Two of them are that the use of a pint more water than is necessary in a one-bag batch reduces the strength as much as would the omission of 2 lb. to 3 lb. of cement; and that the mere use of richer mixtures, while encouraging a feeling of greater security, in many cases causes nothing more than waste of cement because the water is in excess.

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Much attention has been given in recent years to the question of manufacturing alcohol within the Empire for use as motor spirit. In the current number of the *Bulletin of the Imperial Institute* the possibility of utilising the mowra flowers of India for the purpose is discussed. These flowers possess thick, juicy petals, rich in sugar. They are used by the natives as a foodstuff and especially for the preparation by fermentation of an alcoholic liquor called daru or mohwa spirit. A single tree will yield as much as 200-300 lb. of flowers in a year. The tree also produces a valuable oil-seed, which is exported in fairly large quantities to Europe. During the war the flowers were used in India for the production of acetone, the yield being said to be ten times as much as that obtained by distilling wood, which is

The first part of an interesting article on the Agriculture of Cyprus, by Mr. W. Bevan, Director of Agriculture in the Island, appears in the current issue of the *Bulletin of the Imperial Institute*. The subjects dealt with include Live Stock, Dairy Produce, Cereals, Fruits, Nuts and Vegetables. The Messaoria plain is the great corn-growing area and in ancient times the island produced sufficient wheat to supply all the needs of its population which then numbered over a million, the annual production amounting to about 10,000,000 bushels. At the present time, with a population of a little over a quarter of a million, only about 2,000,000 bushels of wheat are being produced, but the yield could be greatly increased by better methods of husbandry, by the use of improved implements for cultivating and reaping and by the use of threshing machines. The methods practised have changed little for ages. The old wooden plough is still used, whilst the threshing floors are practically identical with those of Biblical times, consisting merely of a levelled piece of ground, sometimes paved with flag-stones. A stout board, studded on the undersides with sharp flint stones (the tribulum of Virgil), is drawn over the spread-out sheaves by mules, donkeys or oxen. Large quantities of barley are grown, the production in 1918 amounting to over 3,000,000 bushels. Most of this is used locally for feeding cattle, but some is exported to England for malting purposes. The cultivation of the grape-vine and the making of wines are important industries and the celebrated Commandaria wine, which acquired great fame in the time of the Knights Templars, is still being produced and exported in limited quantities.

According to the "Vaderland," a new system of wireless aerals has been experimented with at Scheveingen, which is the invention of a Dutchman of the name of Vlug. In fact, the word "aerial" is no

longer applicable, as the wires for a length of from 100 to 150 metres are lightly buried in the ground. They are said to be highly sensitive, with the result that two wires are sufficient for direct communication with Bandoeng (Dutch East Indies), the receiver being placed between the two, which contains certain improvements of Mr. Vlug's invention. Comparison has been made between this wiring and the large antennas at Scheveningen, by which it was proved that signals were louder on being received through ordinary aerals, but that not a letter was distinguishable owing to the disturbances. These had not entirely disappeared when employing the Vlug system, but had gained greatly in distinctness, so that not a letter was missed. One lamp was used as a detector and another as a low frequency amplifier. The report goes on to say that the period of the year is especially suited to receive the Bandoeng messages, and also that, although great difficulties are experienced owing to disturbances caused by the large European stations, the Telephunken station at Sambeek contains an improver by which Bandoeng will always be easily detected, but it remains open to question whether it will be practicable for ordinary operators. On the other hand, an instrument constructed by Dr. Koomans, an engineer attached to the Telegraph Service, does not present such difficulties.

The Economic Botanist to the Government of the Punjab at Lyallpur, in the course of his account of experiments in Economic Botany for the year ending 30th June, 1919, says:—It is now clear that Arabian dates of a very much better quality than the local dates can be grown in the date growing tracts of the Punjab. The best Punjab Arabian fruits, cured and packed in cardboard boxes for dessert purposes are eagerly sought after at Re. 0-8-0 per pound and we could sell large quantities of uncured fruits fresh from the trees, wholesale in the local

bazar at Re. 0-2-0 per pound. This is about equal to Re. 0-4-0 per pound for cured and packed fruits. The great mass of the local dates do not fetch more than Re. 0-0-6 per pound. Our work shows that dates could be grown practically all over the plains of the Punjab were it not for the rains in the fruit ripening time rotting the fruits. As the fruits grow in large bunches we hope to overcome this difficulty by bagging them in waterproof bags. We are experimenting on this point. The most serious disease to which the date palm is subject here is red-weevil. (*Rhynchophorus ferrugineus* Olive). It bores into the tree trunks and kills them. We have dealt successfully with attacks of these weevils on our young trees and we are experimenting with methods of dealing with adult trees. We have a large number of requests for suckers from local date-growers, and we are now starting a date farm of 18 acres at Muzaffargarh. An assistant has been placed there recently. The war has prevented us from getting young trees from Mesopotamia for some years, but we hope to get some soon now. The book on the Date Palm and its Cultivation in the Punjab which we have brought out seems to have met a felt want.

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The Department of Overseas Trade is organizing an Exhibition of Timbers grown within the British Empire, to take place at the Holland Park Skating Rink, London, from 5th July to 17th July, 1920. The main object of the Exhibition is to bring prominently before architects, inspectors, firms who have to specify timbers in their contracts, as well as the users and consumers of timbers the full range of Imperial grown timbers, and especially those timbers which up to the present are only very slightly, if at all, known in this country. At the same time the Exhibition will demonstrate the chief uses for which such timbers are suitable.

The classification embraces—

- (a) Specimens of timber ;
- (b) Exhibits demonstrating the various uses to which timbers are put, viz., floors, panelling, staircases, furniture, ply wood, and articles of everyday use ;
- (c) Wood pulp.

A Committee has been formed to arrange all details connected with the Exhibition, and includes representative of—

Colonial Office,
Crown Agents for the Colonies,
Government of India,
Self-Governing Dominions,
Forestry Commission,
British Societies interested in the production and utilization of timber.

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The use of electricity for assisting and improving the growth of plants has passed the experimental stage, and in many large farms, and even in small holdings, it is now employed with complete success. It has been proved that the action of an electric current passing through the soil is very stimulating. The method usually adopted is a network of galvanised iron wires stretched over the field to be treated, and suspended 15 to 18 ft. from the ground from insulators attached to wooden posts placed about sixty yards apart. These posts are in parallel rows, about 100 yards apart. The electrification of the network is accomplished by the use of a very little current at an extremely high voltage. The network is charged positively. The power which is required per acre is quite small. It is calculated that for an expenditure of twenty units per annum per acre the electrical discharge may take place for eight or ten hours a day ; and if the cost per unit is no more than 3d. the price per acre amounts to about 5s. per annum. By this electrical treatment the yield per acre is increased 30 per cent., and even more under certain conditions. The beneficial

effect of electricity on plants is not a new discovery, for it was noticed some years ago that the growth of plants was assisted by the electrification of the atmosphere. In the South of Italy the above described method, with slight modifications, has recently been adopted to assist the growth of Macedonian (Yenitze) tobacco.

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The Government of Madras has issued the following notification in the home (Education) Department. Representations have been made to Government by teachers in aided schools throughout the Presidency both individually and through their associations that the scale of pay which is sanctioned by the managers of schools is not sufficient to meet the increased cost of living due to the changed economic conditions in India. The question has also been brought up for discussion in the Legislative Council. Government have in consequence decided that a sum of money not exceeding Rs. one lakh be allotted for distribution to managers of schools with the object of enabling them to increase the pay of their teachers. The Director of Public Instruction has begun his investigations and will submit proposals to Government for the distribution of additional aid with the object of carrying out the intention of Government as stated at the meeting of the Legislative Council held on the 5th February 1920. The Government will not, however, be prepared to give aid over and above the normal provision of the Grant-in-Aid Code unless they are convinced that local effort has done as much as it can in this regard, and that the management of a school has itself no means of increasing the sum available for the maintenance of the school.

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The Chilean "Revista Economica" calls attention to the considerable progress of the sugar industry in Panama; many enterprises for the cultivation and manufacture of sugar on a large scale having recently been

established in different parts of the Republic. Amongst these concerns figure the Sociedad Azucarera de Chitre, established at that town with a capital of 30,000 balboas, which has just commenced the exploitation of the sugar-cane industry in the Province of Herrera. The Panama Sugar Company operates in the district of Chiriqui Viejo, and owns 11,456 hectares of land, of which 600 hectares are sown with cane. A company has recently been organized by Messrs. Chiari and Gamarra for the erection of a sugar mill and factory in the district of Aguadulce, where they already have 120 hectares sown with cane and have commenced the sowing of a further 200 hectares. This last enterprise has just received from the United States machinery capable of crushing 240 metric tons of cane per 24 hours, representing a production of over 26 metric tons of sugar in the same time. The Panama Sugar Company, it is stated, has invested 800,000 dollars in this company.

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The Report on the Administration of Coorg for the year 1918-19 says:—The receipts from the sale of sandalwood were again extraordinarily good, and the Forest Department realized a net surplus of Rs. 2,58,351. Very considerable progress was made in the construction of the Forest Tramway in the Western Ghats. It is hoped to finish this work in the present year. The extraction of the magnificent timber from these virgin forests will, in all probability, increase the revenue of the department many times over. Proposals were also made for the construction of a tramway in the eastern forests. In addition, silvicultural operations were continued with vigour throughout the province. Sandalwood, in special, is receiving close attention both as regards its regeneration and its growth. Mr. Hart, the Inspector-General of Forests, visited the province in December and January and inspected a large proportion of the works in progress. The exploitation of the Coorg

forests is a matter of the greatest importance to the province. Considerable additions to the existing staff, both superior and inferior are urgently required and partial proposals were submitted during the year and are now under consideration.

It is to be hoped says the *Times*, that the movement, which is now gaining impetus, for the encouragement of cotton-growing in the Empire will be followed by a similar effort to reduce our dependence on foreign supplies of sugar. As is well known, there is a world shortage of sugar, last year's crop being estimated at fully 2,300,000 tons less than the crop of 1913-14. The European beet sugar crop, which before the war amounted to nearly half the world's output, has sunk to well under a quarter of the total, and only about half the deficiency has been made good by increased supplies of sugar from other parts of the world. Statistics prepared by the West India Committee give the annual sugar crop of the Empire, exclusive of India, before the war as rather under 900,000 tons, and it is estimated that five times this amount could be produced. There can be no question as to the advisability of retaining the £ 25,000,000 to £ 30,000,000 spent annually on sugar within the Empire, and a strong movement to achieve this object is badly needed, particularly in view of the real danger that some of the existing sugar lands may be diverted to other crops, such as cotton.

The Advisory Council of the Committee of the Privy Council for Scientific and Industrial Research have published a Memorandum on Solid Lubricants which has been prepared by their Lubricants and Lubrication Committee. This Committee was appointed in July 1917, to survey the field for research on Lubricants and Lubrication, and in the course of their work dealt with the question of Solid Lubricants. The Memorandum embodies existing knowledge on the

subject but the Advisory Council desire that the Bulletin should be regarded rather as a summary of existing literature than as an authoritative statement based upon actual research work. The subject is dealt with under the following main headings: (1) Characteristics of Solid Lubricants. (2) Action of Solid Lubricants. (3) Analyses of Lubricating Graphites. (4) The Grading of Graphite. (5) Hot Bearings. (6) Methods of Applying Solid Lubricants. (7) Drawbacks to the use of Colloidal Solid Lubricants. (8) Observations on Results obtained by the use of Solid Lubricants. The Bulletin is published by H. M. Stationery Office and may be purchased through any bookseller, or directly, price 6d. net, from H. M. Stationery Office.

On April 19th, 1917, a paper by Mr. R. S. Pearson, F.L.S., on "The Recent Industrial and Economic Development of Indian Forest Products" was read before the Indian Section of the Society. Sir Robert W. Carlyle, late Revenue and Agricultural Member of the Government of India, who presided on the occasion, referred to the possibility of every great development, with a sufficiently adequate staff, more roads, and the best mechanical means of extracting the timber. In view of these problems the Government of India has recently decided to create a Forest Engineering Service, paid on the same scale as the Imperial Forest Service. It is proposed that the recruits to the new service should be trained in Canada and the United States, where, it is pointed out, the subject of timber extraction and utilization has long been studied, and improved methods have been introduced under conditions approximating those encountered in many parts of India and Burma.

Much attention has been given in recent years to the question of manufacturing alcohol within the Empire for use as motor

spirit. In the current number of the *Bulletin of the Imperial Institute* the possibility of utilising the mowra flowers of India for the purpose is discussed. These flowers possess thick, juicy petals, rich in sugar. They are used by the natives as a foodstuff and especially for the preparation by fermentation of an alcoholic liquor called daru or mohwa spirit. A single tree will yield as much as 200-300 lb. of flowers in a year. The tree also produces a valuable oil-seed, which is exported in fairly large quantities to Europe. During the war the flowers were used in India for the production of acetone, the yield being said to be ten times as much as that obtained by distilling wood, which is the usual source of this substance. The demand for acetone in India in peace times, however, is not great, and large quantities of the flowers would be available for the manufacture of alcohol, and would appear to be an exceptionally cheap source of this material as the yield is high compared with that from potatoes and other materials commonly used, about 90 gallons of 65 per cent alcohol being obtainable from one ton of dried flowers. It has been estimated that in the Hyderabad State alone there are already sufficient mowra trees for the production of 700,000 gallons of proof spirit per annum, in addition to that necessary for the local liquor requirements. It is suggested that the most profitable way of utilising the flowers would probably be as a source of mixed motor spirit of the "natalite" type for use in India. That motor spirit can be produced on a manufacturing scale in India from mowra flowers has already been demonstrated and it is stated that running trials with the spirit proved satisfactory.

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An article in the *Board of Trade Journal*, February 5th, points out that while there are many gaps in the range of dyes now being produced by British makers, the position is distinctly hopeful, and that there is every ground for the belief that the main difficulties inherent in the creation of so compli-

cated an industry as the coal-tar chemical industry have been successfully surmounted. It took the Germans forty years to reach their present position, and it cannot be expected that we can attain the same position, even with the valuable stimulus of a five year war period, in much less than ten to fifteen years. Hence the proposal for the temporary protection of the industry for a limited period. The present output of dyes in this country is not less than 25,000 tons per annum.

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A Press Communique of the Government of India Department of Commerce dated Simla, the 10th April says:—The question of the location of an aerodrome for Calcutta has been engaging the attention of the Government of India for some time past. A site in the vicinity of the Ammunition Factory at Dum Dum was suggested by the Officer Commanding, Royal Air Force in India, but as it was open to various objections efforts were made to find a more suitable site elsewhere. These attempts have, however, been unsuccessful, and the Government of India have now accepted the recommendation of the Air Board that the Calcutta aerodrome should be located at Dum Dum, and it is hoped that the preparation of the site will be completed before the arrival of the monsoon.

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We are in receipt of a copy of *An Evening at the World Trade Club*. The booklet gives an account of the meeting held on the evening of 18 June, 1919, at which one of San Francisco's leading commercial organizations discussed a vital issue of the day—the question of world standardization of weights and measures. The club resolved to respectfully urge that the units of the Metric System be adopted by the Congress of the United States of America and the British Parliament as the exclusive legal standards of weights and measures. The metric system is simple, logical, and easy to use, because it is a decimal system with only three units—meter, liter, gram. It is earnestly hoped that every one will give this standardization his hearty support.

The 9th meeting of the Education Section of the Board of Industries was held at Cawnpore on the 15th March. Amongst the matters disposed of were applications for grant-in-aid applied for by the Y. M. C. A. Commercial School, Allahabad, and London Mission Girls' School, Almora. Codes of Regulations of the Technical School, Jhanasi, and the Carpentry and Smithy classes opened recently at the Central Weaving Institute, Benares, and a scheme for the transfer of the Electrical and Mechanical classes from the Thomason College, Rurki, to the Technical School, Lucknow, were also framed. A scheme for the expansion of scholarships in several of the Technical Schools were also considered and recommended to Government.

We have been favoured with a copy of *Millard's Review of the Far East*, for Jan. 17th. The *Journal* is devoted to Far Eastern Topics of current interest and is published by the Millard Publishing Co., Inc. 113, Avenue, Edward VII, Shanghai, China. In the number for January 17th, there is an interesting article on Sir John Jordan, British Minister in China, who is retiring from his post after 43 years of service. The article takes the form of a biographical memoir of Sir John Jordan. The writer, apparently a Chinaman himself, adduces many reasons to show why his countrymen love Sir John and winds up by saying that he has been as Confucius would say, a truly straightforward friend.

A new use for the vast quantities of waste material produced in quarrying slate has, according to the *Chemical Trade Journal*, been developed in Carnarvonshire, where a Company is powdering the waste and selling it as a filling material. It is said to be useful in a manufacture of asphalt, bricks, cement, abrasive soaps, cleansers, glass, linoleum, moulded and mechanical rubber goods, pottery, slabs and tiles, distempers, paints, insulators, etc.* It produces bricks which are at the same time dense, strong, and hard, and which show a considerable saving in manufacturing costs. The silica content ensures that they are capable of withstanding a very high temperature.

The amount of cotton seed received at the mills in the United States from 1st August

to the end of 1919 was 2,868,795 tons, as compared with 3,220,512 tons during the same months in the preceding year. Statistics compiled by the Bureau of the Census show that during these five months in 1919, 23,57,402 tons of seed were crushed, as compared with 21,22,825 tons in the same period in 1918, and the quantities on hand in the mills at the end of the year were 535,118 tons, and 1,138,125 tons in 1919 and 1918 respectively. Exports during the period mentioned in 1919 amounted to 13,539,702 pounds, and for 1918 to 4,904,014 pounds.

Such articles as pearl buttons, combs, brushes, etc., previously obtained by Switzerland from Germany, are now being imported from Japan. One firm alone imports Japanese pearl buttons to the value of about 4,000,000 francs. The shipments are usually directed *via* Marseilles and lately *via* Antwerp. The banking arrangements are made through the Yokohama Specie Bank, or the Hongkong Banking Co-operation of Lyons. A well-known Swiss trader desires therefore to call the attention of British manufacturers of pearl buttons, combs, brushes, etc., to the substantial market which is open to their goods in Switzerland.

American manufacturers of motion picture films are considerably interested in the results of experiments conducted by the Celluloid Company of New York, which claims to have perfected a synthetic substitute to take the place of camphor in the manufacture of motion picture films. The substitute, it is stated, will eliminate much of the inflammable nature of the film. It is believed that the manufacture of this material in commercial quantities will eventually make American producers independent of the Japanese camphor monopoly, which has cut its allotment to the United States for the year 1920.

It appears from an answer given to a question in Parliament that the sales of the Home-grown Timber Department last year approximated in value to £3,700,000. The Department, it was mentioned, is being wound up as rapidly as possible. There are still about 6,500 workpeople—sawyers, fellers, etc.—on its pay roll.

GLEANINGS.

The authorised capital of companies organized during 1919 in the United States of America for the manufacture and distribution of Chemicals, drugs, and dyes, amounted to 112,173,000 dols., as compared with 73,403, dols. in 1918, and 146,160,000 dols. in 1917. Since the outbreak of the war these industries have expanded greatly, as is indicated by the formation from 1st August, 1914, to the end of 1919, of companies involving an aggregate capital of over 500,000,000 dols. The development year by year since the beginning of the war is shown in the following table:—

	Dols.
Five months, 1914 ...	16,838,000
Year, 1915 ...	65,565,000
Year, 1916 ...	99,244,000
Year, 1917 ...	146,160,000
Year, 1918 ...	73,403,000
Year, 1919 ...	112,173,000
Total ...	513,383,000

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A movement to establish a National Laboratory Foundation for Invention and Research is on foot in the United States of America. It is proposed that the Foundation should be established by independent endowments of wealthy men and large industrial firms, and should then become self-supporting by a percentage arrangement on the inventors which the laboratory will help to develop and market, giving financial aid to the poor inventor. Plans for the establishment of the Foundation have been going on for two years under the direction of Mr. Thomas Howard, Executive Chairman of the National Institute of Inventors, which has a membership of nearly 3,000.

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The cost of living in the United States has advanced a fraction more than 80 per cent since July, 1914, according to a statement issued by the American National Industrial

Conference Board. The figures, it was announced, are based on the study of family budgets reported by the United States Bureau of Labour Statistics, supplemented by reports of clothing and food dealers, civic organizations, real estate agents and public utility corporations. Clothing has increased most in price since July, 1914, the percentage being 135. Food comes next with an advance of 92 per cent; fuel, heat and light next with 48 per cent and rent 38 per cent. Food advanced only one per cent in price during the five months, August-December, 1919, while clothing prices again led the van with an increase of 15 per cent. Items listed generally as sundries advanced 75 per cent during the five year period, and 7 per cent since last July. Sundries include car fare, candy and soda, amusements, insurance and household furnishings. Picture theatre charges advanced more than 100 per cent and also the cost of furnishing a house.

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The so-called rare sugars are used to a considerable extent by the Army Medical Corps and by the medical profession in general. One of the principal uses to which they are put is the differentiation of bacteria, for which purpose they are invaluable. For some time the United States Bureau of Standards has had presented to it for test a number of these rare sugars. Owing to the large demand for one of these sugars, known as d-Mannite, the Bureau undertook, at the request of the United States War Department, the production of a considerable quantity of this substance. The source of supply is a crude manna. The Bureau's investigations finally developed a method whereby pure white crystals of d-Mannite can be produced by two crystallisations from the crude manna. It has thus become possible to produce relatively large quantities of this valuable substance at a reasonable cost.

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An "Empire Timber Exhibition" will be held at the Holland Park Skating Rink from

July 5th to July 17th. It is being organized by the Department of Overseas Trade with the primary object of bringing prominently before architects, inspectors, and firms required to specify timbers in their contracts, as well as before users and consumers, the full range of Imperial grown timbers, and especially those kinds which up to the present are only slightly, if at all, known in this country. It is also desired at the same time to demonstrate the chief uses for which such timbers are suitable. Almost all the self-governing Dominions, Crown Colonies, and Protectorates have definitely decided to participate. A limited amount of space will be available for the use of traders in this country in which to display specimens of articles manufactured from timbers grown within the British Empire.

Roof timbers in buildings where high humidity is the rule have been a source of trouble to operators of paper and cotton mills and other industries, because of their tendency to decay rapidly. In order to determine the best means of preserving such timbers the Forest Products Laboratory at Madison, Wis., has conducted a series of tests of the various treatments. As a result, it was recently announced that the pressure method, with either creosote or a zinc chloride solution, will give better results than steeping, dipping or painting. Twenty years may be added to the life of the wood by this treatment, it is declared, though it is admitted to be the most expensive. Each cubic foot of timber should receive 8 to 12 pounds of zinc chloride, if the latter is used.

A statement has appeared in the Boston press to the effect that long staple cotton has been grown for the first time in the southern plains region of West Texas. Cotton experts had believed that the high altitude would militate against the successful production of this commodity, but a farmer in the region has planted a small acreage with a yield of

five bales, the first bale of which he sold at 62 cents a lb. It is stated that the crop did exceedingly well from the beginning, and that the yield was as heavy as the ordinary short staple, no special irrigation being required to produce this result. It is expected that in view of this initial success the acreage of long staple cotton will rapidly increase.

About 160 Chinese students in Chungking (China) are now taking a preparatory course in French in the hope that they will be able to proceed to France next autumn to pursue higher industrial education in French colleges. A special school has been started for them, and many of them have been granted free tuition and will be advanced the money for their journey.

In making the frames and wings of aeroplanes and airships in Italy, preference is given to Ashwood because its fibres are fine, compact, strong and with few knots. Ash grows well in the South and centre of Italy, in loose, slightly moist, or even dry soils. Its trunk is straight and exceeds 65 feet in height.

The first Class Silkworm Feeding and the High Primary Schools in Taikang (Honan, China) have raised a sum of about \$80 for organizing peddlers groups to sell Chinese National products.

The Government of Hayti have granted a concession to the Anglo-Haytian Sugar Company for the erection of a Sugar Central and other enterprises in Hayti.

Instructions have been issued by the Industrial Bureau (Honan, China) to all the districts, to organize the Industrial Promotion offices.

ECONOMIC NOTES.

INDUSTRIES AND COMMERCE.

IMPERIAL PREFERENCE.

Report of Council Committee.

The report of the committee on the subject of Imperial Preference has been published on April 19, together with a brief resolution which stated that the recommendations made by the committee were receiving the careful consideration of the Government of India and their decision would be notified as soon as possible. The following is the report:—

In accordance with our terms of reference we have examined the trade statistics of imports into and exports from India. Statistics have also been laid before us relating to the imports into the United Kingdom and other principal ports of the British Empire of certain articles which India produces or which there is a likelihood of her producing in the near future. We attach to this report a copy of a memorandum which has been laid before us and statements showing the value and the duty as at present levied on the imports of these articles into the United Kingdom and the principal dominions in the years 1912 and 1918. We first considered the question whether the application to the Indian customs tariff of a system of preference in favour of goods of Empire origin would be likely to involve any danger of retaliation by countries outside the Empire in respect of our export trade. So far as we are able to judge we are unanimously of opinion that in view of the demand for our raw materials there is no danger to be feared on this score and that the apprehensions of Lord Curzon's Government in respect of this particular aspect of the question would in the present circumstances be unreal.

Having disposed of this aspect of the question we considered in what directions loss and in what directions gain would be likely to result from the adoption of a system of preference in our import tariff. It seemed to us probable that we are to secure from our customs duties the financial resources which we require. The adoption of a system of Imperial Preference would entail the raising of the present import duties against foreign nations. This would presumably result in raising to some extent

the prices of imported commodities to the consumer in India and from this aspect would be likely to be injurious. Looking to the profit to trade, the number of commodities in our export trade which might be expected to benefit by an increased market within the empire appeared to us to be limited. Our general conclusion is that India is neither likely to gain nor to lose appreciably on the balance by the adoption of a moderate preference in our import duties. Though these are our provisional conclusions we feel that we are not able to give an authoritative opinion on the subject and we consider that such an opinion can be obtained through the recommendation which we make below. By our terms of reference we were asked to report as to the best method of considering the future fiscal policy of India. We think that this can only be effectively enquired into by means of a commission with power to take evidence in various parts of the country from all the interests concerned, from importers and exporters, producers and manufacturers, and from persons entitled to speak on behalf of consumers. In the connection we think it right to draw attention to the fact that the fiscal questions were specifically excluded from the purview of the Indian Industrial Committee and it seems to us desirable that the enquiries of the commission should be followed by the appointment as early as convenient of an equally strong and representative commission to examine the whole question of the future fiscal policy of India.

D. E. Wacha,

A. H. Ley.

Sita Nath Roy.

Fazulbhoi Currimbhoy.

G. M. Chitnavis.

B. N. Sarma.

G. S. Barnes.

Claude H. Hill.

R. A. Mant.

Zulfiqar Ali Khan.

W. E. Crum,

Nigel F. Paton.

I agree but I would substitute for the words in the present circumstances, in the last line of paragraph 2 the words, 'so long as existing conditions continue' to make my meaning clear.

B. N. SARMA.

UNITED STATES SUGAR TRADE
IN 1919.

It is stated by the United States Sugar Equalisation Board that of the shipments to Britain in the fiscal year ending 30th June, 1919, totalled 1,124 million lb., 870 million lb. were for the account of the British Royal Commission on Sugar Supply in the allied countries of Europe.

This refined sugar was the product of 930 million lb. of raw sugar purchased by the Royal Commission from Cuba, imported into the United States for the purpose of refining, and then exported to the United Kingdom, France, Italy, or foreign possessions of these countries. This amount of sugar, therefore, although included in the import and export statistics of the United States, is different from ordinary exports because, being of British ownership, it is not taken out of supplies that otherwise would go into domestic consumption, and represents no deduction from stocks of sugar in the United States.

TRADE INTERESTS.

A memorandum prepared by the Statistical Division of the United States Bureau of Foreign and

Domestic Commerce states that the American receipts of cane sugar from foreign countries and from non-contiguous territories during 1919 have broken all previous records. During the ten months ending with October the total receipts amounted to 8,237,453,522 lb., valued at 481,424,107 dols., which is 1,759,988,484 lb. more than for the corresponding period in 1918, and represents an increase of 27·2 per cent in one year. Shipments during the first ten months of 1919 amounted to 1,258,168,072 lb., valued at 96,982,888 dols., against 286,251,092 lb., with a value of 18,930,821 dols. in 1918, an increase of 339·5 per cent in quantity and 412·3 per cent in value.

The receipts of sugar for the ten months ending October comprise 6,392,138,811 lb., valued at 355,725,617 dols., imported from foreign countries, 1,103,555,180 lb. of raw sugar, valued at 71,998,124 dols., and 23,902,500 lb. of refined sugar, valued at 51,549,116 dols., from Porto Rico. Domestic exports of 1,246,869,413 lb., valued at 96,033,653 dols., shipments of 6,584,765 lb., valued at 618,031 dols., to non-contiguous territories, and re-exports of 4,713,894 lb. of foreign sugar, valued at 331,204 dols., make up the total of 1,258,168,072 lb. of sugar, valued at 96,982,888 dols., shipped in January-October.

Presented in tabular form the total cargoes of sugar inward and outward during the first ten months of the last three calendar years were :—

January-October					Receipts		Shipments	
					lb.	dols.	lb.	dols.
1917	...	...	...	...	6,907,266,260	334,531,578	976,484,508	62,189,394
1918	...	...	...	...	6,477,465,038	322,742,886	286,251,092	18,930,821
1919	...	...	...	...	8,237,453,522	481,424,107	1,258,168,072	96,982,888

SOURCES OF THE SUGAR PURCHASED.

More than 6,000 million lb. of the sugar received from foreign countries was supplied by Cuba. The Philippine Islands rank second with 175,432,529 lb Imports from the Virgin Islands and the Dutch East Indies show marked increases over the two years preceding. In direct contrast there is a decrease

from 91,833,829 lb. in 1917 to 73,700 lb. in 1919 in the imports of sugar from the Dominican Republic, and from 29,525,000 lb. in 1917 to 1,123 lb. in 1919 in those from Japan. The receipts by countries of origin for the ten months ending with October of the last three years are shown in the following table :—

Received from				Fiscal years ending 30th June		
				1914	1918	1919
				lb.	lb.	lb.
Central America...	...	...	...	40,202,480	166,292,751	158,343,135
Mexico	...	...	...	49,385,504	31,118,515	21,963,490
West Indies :—						
Haiti	...	...	...	2,124,432	25,849,779	47,949,384
Other	...	...	...	2,586,837	4,391,138	9,074,645
Brazil	...	...	...	743,113,500	743,958,456	571,921,575
Colombia	...	...	...	91,830,513	112,159,390	121,416,448
Venezuela	...	...	...	49,953,478	50,122,484	85,007,646
Other South America	...	...	...	2,113,506	4,392,895	4,252,158
Aden	...	...	...	2,271,202	...	762,594
Dutch East Indies	...	...	...	8,421,592	4,687,538	13,583,965
Japan	...	...	...	...	...	7,859,567
Turkey in Asia	...	...	...	1,838,128	...	5,440
Other countries	...	...	...	7,669,756	758,236	3,800,225
Total from foreign countries				1,001,510,928	1,143,731,180	1,045,940,235
Hawaii	...	...	...	4,430,722	1,968,080	5,623,145
Porto Rico	...	...	...	420,644	256,697	276,529
Total from non-contiguous territories				4,851,366	2,224,777	5,899,674
Grand Total, quantity				1,006,362,294	1,145,955,957	1,051,839,910
				dols.	dols.	dols.
Grand Total value				111,454,240	103,355,279	144,069,369

Imports of beet sugar for the first ten months of 1919 were 1,180 lb., valued at 108 dols., and of maple sugar, 3,593,221 lb., valued at 1,011,228 dols.

DESTINATION OF THE SUGAR SHIPPED.

The export and re-exports of refined sugar for the

ten months ending with October, 1917 to 1919, are given in the following table by countries of destination :—

Shipped to—					10 months ending October		
					1917	1918	1919
					lb.	lb.	lb.
Austria-Hungary	...	...	...	...	...	...	2,021,429
Belgium	...	...	...	...	17,362,379	25,416,000	16,485,998
Denmark	...	...	...	...	3,091,386	...	9,841,526
Finland	...	...	...	...	...	...	11,205,648
France	...	...	...	...	323,494,438	127,253,009	529,075,554
Gibraltar	...	...	...	...	560,000	...	76,235,000
Greece	...	...	...	...	906,295	1,000	32,103,027
Iceland	...	...	...	...	5,532,427	22,400	2,616,455
Italy	...	...	...	...	28,067,011	19,671,159	58,931,136
Netherlands	...	...	...	...	6,085,360	...	1,438,441
Norway	..	...	...	...	76,408,172	10,090,012	13,623,850
Spain...	...	...	...	...	57,260,091	...	55,917,608
Switzerland	...	...	...	...	21,503,960	28,100	2,240,747
Turkey in Europe	...	...	...	...	...	...	27,490,780
United Kingdom...	...	...	...	...	118,837,498	14,506,261	326,095,676
Canada	...	...	...	...	643,370	47,415,994	443,953
Mexico	...	...	...	...	38,901,207	2,434,024	25,035,338
Argentina	...	...	...	...	143,408,561	60	546,200
Chile	...	...	...	...	2,008,735	20,305	470,875
Paraguay	...	...	...	...	...	...	2,350,000
Uruguay	...	...	...	...	46,400,392	22,400	29,334,200
Japan...	...	...	...	...	472,097	150	297,155
Turkey in Asia	...	...	...	...	...	...	1,446,400
Philippine Islands	...	...	...	...	254,040	12,360	3,064,656
British Africa	...	...	...	...	3,428,580	965,167	1,401,826
French Africa	...	...	...	...	661,071	386,571	3,419,167
Morocco	...	...	...	...	67,000	13,084,500	616,000
Other countries	...	...	...	...	54,131,912	16,161,653	13,120,768
Total to foreign countries	...	...	...	...	948,487,982	277,491,125	1,246,869,413
Alaska	...	...	...	...	7,085,135	7,542,602	4,882,279
Hawaii	...	...	...	...	1,485,200	127,168	896,958
Porto Rico	...	...	...	...	5,474,582	185,404	805,528
Total to non-contiguous territories	...	...	...	...	14,044,917	7,855,174	6,584,765
Re-exports of foreign sugar	...	...	...	...	13,951,609	904,793	4,713,894
Grand total	...	...	...	...	976,484,508	286,251,092	1,258,168,072

These exports include not only sugar that is grown in continental United States and the non-contiguous American territories, but also all raw sugar received from foreign countries and refined in the United States, such sugar being then regarded as domestic. The re-exports consist of foreign sugar that was re-shipped in the form in which it was first received.

YEAR'S BEST CUSTOMERS—AVERAGE PRICES.

Europe took more than 90 per cent of the total exports, France and the United Kingdom being the largest individual purchasers. Remarkable gains are shown in the exports to Finland, Gibraltar, Greece, and Turkey, while shipments to Norway and Switzerland declined. Exports to South America show a large decrease in the last two years. Argentina having received only one-half million lb. in 1919, against 143 million lb. in 1917.

The price of the sugar imported from foreign countries during January-October, 1919, averaged 5·6 cents a lb., against 4·7 cents in the like period of 1918, and 4·5 cents in 1917. The average price of the sugar received from Hawaii was 6·5 cents, and from Porto Rico 7·2 cents. The average price of the sugar shipped was 7·7 cents a lb. in 1919, 6·6 cents in 1918, and 6·4 cents in 1917.

THE SEED-CRUSHING INDUSTRY,

Development During the War.

Before the Royal Society of Arts on December 3, Mr. J. W. Pearson, chairman and managing director of the British Oil and Cake Mills, Ltd., read an interesting paper on "The Seed-Crushing Industry." Lord Lamington presided at the meeting.

The seed-crushing trade, Mr. Pearson said, was probably one of the oldest industries in the world, and yet, like many another whose importance had not always been fully realised from a national point of view, it was left for the outbreak of the most devastating war in history to bring about a recognition of its vital importance. At the time of the outbreak of war there were some sixty different firms engaged in the trade in Great Britain ranging in importance from small country owners with a mill capacity of 5,000 tons of seed per annum to the establishments of the British Oil and Cake Mills, Ltd., whose combined branches handled something like 45 per cent of the entire industry. The impor-

tance of ensuring that oilseed factories should be kept fully at work during the war was quickly recognized, but, curiously enough, it was in the first place at the instance of firms engaged in the soap trade, who pointed out that the supply of glycerine for the manufacture of explosives was dependent upon the maintenance of adequate supplies of oils for soap manufacture. It was therefore considered necessary to include the trade of seed-crushing in the group of "controlled industries" under the Ministry of Munitions. Later on, the other aspect of the trade became more dominant, and the importance of the mills as a source of food supply—firstly, for the production of edible oils required for the manufacture of margarine, and secondly for the cakes so necessary to the production of meat and milk—resulted in the transfer of control from the Ministry of Munitions to the Ministry of Food. While during the days of its early growth this trade was mostly centred at the principal shipping ports, Hull, London, and Liverpool, there had been a gradual extension of factories at the outports.

BRITISH EMPIRE'S OILSEED CROP.

The major portion of the oilseed crops of the world were produced within the British Empire, and it was interesting to note that while a few seeds, notably linseed, rapeseed, and sunflowerseed, were grown in the Temperate Zone, the remainder were grown almost exclusively in the Torrid Zone, and, therefore, had to be imported by Europe for consumption there. England grew no oilseed crops, and was, therefore, dependent upon import for the whole of her oil production; but the continent of Europe raised considerable quantities of linseed, rapeseed, poppy, and sunflower. The claim to regard the oilseed trade as one of the key industries of the country was surely established when due regard was given to the huge quantities of oil required by the manufacturers of soap, paint, linoleum, varnish, lubricants, and burning oils among the technical trades; and baking, frying, cooking fat, and margarine manufacturers among the edible trades. The total consumption of oils for these purposes in Great Britain was estimated at 600,000 tons per annum.

As the world's requirements in oils and fats grew every day, the story of past development had been the loss to the technical manufacturer of one after another of his markets for cheap oils, in proportion as scientific achievement had enabled each in turn to be rendered suitable for the edible trades; so a substitute had always to be found to replace for the soap pan the oil now used for margarine. A multitude of varieties of less known oilseeds were found in the world in enormous quantity, but they were either in

districts at present inaccessible or else in a condition or form that rendered them almost unserviceable; but there was little doubt that in years to come, with future scientific developments and treatment, these would take their place among the important sources of oil supply.

Dealing with the products, Mr. Pearson said that it was in handling the products of the mills that the most interesting developments had taken place in recent years, more particularly perhaps as regards the oil product, as the great and increasing demand for oils and fats of all descriptions during the last century had been the reason for the large increase not only in quantity but in variety. Indeed, many oils which less than a century ago had but little commercial value had now been brought into extensive use, not only for technical but also for the finest edible purposes. The most important developments had been connected with the edible oil refineries.

OIL-CAKES.

The other product of seed-crushing upon which a few words must be said was the residue or cake so largely used for cattle-feeding. The cakes most ordinarily produced in this country—*i.e.*, linseed cake and cotton-seed cake—were so well known as to need but few remarks. It was, perhaps, not generally recognized that cake as a feeding-stuff was not only a concentrated food, but a cooked food. Its intrinsic value depended largely upon the extent of concentration, which varied entirely with the individual seed used. By far the most popular cake in England was linseed cake, which showed no sign of being routed from its premier position even by the introduction of more modern articles, such as sesame and ground-nut cake. Linseed cake served an all-round purpose which was attained by no other, and might be used either as a fattener or a milk producer. For dairy purposes ground-nut cake and coconut cake had become exceedingly popular, and would become more so as the industry increased in England. The newer production, palm-kernel cake, was still a difficult market. The residue was unpleasant in the mouth, woody and unpalatable to the feel and taste. It was not consumed with relish by either cattle or sheep, and possibly the high proportion of fatty acids in the oil content might have something to do with its slightly unpalatable flavour. As a pig food it had always had an enormous outlet in Germany, and, while its qualities in that direction had been demonstrated over and over again in the last few years, it still remained to be seen whether it would be able to oust barley meal from its position as the pigfeeder's favourite when once the supplies of ordinary feeding-stuffs reached normal levels again. When properly ground there was no doubt as to the

feeding value of palm-kernel cake, and great efforts would be made to extend its use in England in order to ensure that this country might be able to retain the palm-kernel crushing trade which had been carried on here during the last four or five years, and which previously was almost an entire monopoly for Germany.

A trade round which much debate had centred had been that of the production of cottonseed cake. The practice in England had differed from that in most other crushing centres of the world. The difference in systems was usually described as the production of decorticated cake or undecorticated cake. The American crusher decorticated the whole of his seed, crushing the kernel alone and producing thereby a cake rich in albuminoids and highly concentrated as a feeding-stuff. The shell, however, was largely wasted or had to be sold at a very low price. The practice in England had been to crush the whole seed at one operation, kernel and shell together. This system produced cake of lower value with a lesser degree of concentration, and consequently a more bulky feeding-stuff. It retained, however, certain astringent properties which were highly valued for use with the soft lush grass of this country as a sheep or cattle food, and when fed to grazing beasts it had no effective substitute. The result had been that relatively higher price was paid here for undecorticated cake than for the decorticated, and consequently the American process had never found favour on this side.

Mr. E. D. Segundo said that cotton-seed might for all practical purposes be divided into two categories—the woolly or upland variety and the bald or Egyptian variety. In the case of the bald variety, the long staple cotton was practically all removed in the ginning process, and went to the textile industry: in the case of the woolly variety there was retained by the cottonseed in ginning an undergrowth of short cotton fibres. Of the 12,000,000 tons of cottonseed produced in the world in an average year, 95 per cent was of the woolly variety. When the woolly fibres were removed they formed a well-known trade commodity called linters, from which was produced explosives, paper, felt hats, and many other things. A recent machine had enabled the defibrating process to be carried a stage further than hitherto, producing a commodity called seed lint, and at this point the woolly seed was reduced to the same condition as the bald variety. So far as the British seed-crusher was concerned, he took the seed in hand at this stage, turned it into oil and cake, and there the process stopped. But the American practice was different. The American decorticated his seed, and, in order to ensure efficient decortification, it was necessary that part of the fibre should be left upon

it. The American split the seed, took out the kernel, and produced three products as against the two of the Englishman. He produced the oil, the hulls—which were the remnants of the seed after the kernel was extracted—and a highly nitrogenous and concentrated food in the shape of the decorticated cake.

COTTONSEED UTILISATION.

A machine, which had only been introduced commercially about two years before the war, separated the hulls into their component parts, hull fibre and shell bran. Linters, seed lint, and hull fibre were all different grades or qualities of the residual fibre left on the woolly cottonseed after ginning, and were all equally available for the production of cellulose, which was the basis of a number of industries, such as the manufacture of absorbent cotton, writing papers, artificial silk, artificial leather, and celluloid. Previously to the introduction of the machines alluded to for the defibrating of the woolly cottonseed, a great deal of the cottonseed produced had been unsuitable for the British seed-crusher; hence it might be considered that this kind of cottonseed was now entering upon a new era in its history. Mr. Pearson had pointed out that until comparatively recently the British seed-crusher was concerned mainly with the production of cake, hence his desideratum had been a raw material containing not too large a proportion of oil. On the other hand, manufacturers on the Continent for some years before the war had gone ahead in the manufacture of edible oils, and had therefore sought out the raw materials which gave the highest percentage of oil. The war had changed a good many things, and amongst others it had entirely revolutionised the ideas of the seed-crusher in this country as regards the primary product of his industry; the richer oil producing seeds had become much more prominent, but they would not force cottonseed into the back ground. Professor Todd had estimated that to meet the world's requirements there must be a cumulative increased production of 800,000 to 1,000,000 bales of cotton per annum, so we might look for a proportionate increase in the production of cottonseed, and 90 per cent of it would be of the woolly variety. Whatever might be said about the richer seeds, cottonseed oil was still unrivalled as a means of producing margarine and other edible oils; so, provided the cottonseed was thoroughly cleaned by the seed-crusher before it was treated further, it would take in the near future a far more important place in the category of raw materials than it had held in the past.

Mr. Chadwick the Indian Trade Commissioner, said that in our tropical possessions we had a very large area of land suitable for the production of ground-nuts, copra, and rich bearing oilseeds. Taking the Empire as a whole, we produce more of the richer oilseeds than of the poorer ones. The fact that crushers in this country had not wanted the richer oil seeds had led India to seek a market for them in Continental countries. Some authorities considered ground-nut cake to be for feeding purposes in no way inferior to cotton cake.

BOOKS IN BRIEF.

India in the years 1917-18.—By L. F. Rushbrook Williams, *Fellow of All Souls. Superintendent, Government Printing, India, Calcutta.* Price Re. 1. or 1sh. 6d.

This is the first time that a Report of this kind has been drawn up by a scholar of the type of Professor Rushbrook Williams. The period covered by the Report has been one of more than ordinary interest. Professor Williams has described the history of the progress of the country during this period with great skill and considerable literary acumen. The narrative is divided into certain main heads, which may be referred to here to show the range covered by it:—India and the War; the Political Record; The Economic Background; Some Lines of Advance: Moral and Material, and Some Governmental Activities. It will be seen that Professor Williams has had to deal with controvertial matters of a kind as well. On these he writes with ease, though opinions will naturally differ as to his deductions. As a resume of current history the book is worth reading.

The Silk Industry and Trade.—By R. C. Rawley, *M.A., M.Sc. (Econ). Carnegie Research Fellow. Published by P. S. King & Son. L. W. Westminster.*

We have reviewed in this *Journal* at length Mr. Rawley's larger book on this subject. This book covers much the same ground, being a study in the Economic organization of the export trade of Kashmir and Indian silks, with special reference to their utilization in the British and French markets. Mysore is silk producing country and its interest in the topics dealt with by Mr. Rawley in this book is manifestly great. We think there is point in Rawley's operation that an inquiry conducted on practical lines in Japan and America would be of great value to our silk industry. We commend the volume to all interested in Sericulture in the State.

The Future Government of India.—By Mr. Ernest Barker, *M. A., Fellow and Tutor of New College, Oxford. Messrs. Methuen & Co. Ltd., London. 1sh. 6d. net.*

This book is made up primarily of papers and letters on the Montagu-Chelmsford Scheme of Indian Reforms. Mr. Barker's exposition of the future Government of India is based on the report, while the letters included in the book are from a Civilian from India on the same subject. The criticism contained in the letters is shrewd and the value attached to it by Mr. Barker is fully justified. The scheme included in the report is now an Act of Parliament. In working it and making it success both the

people of this country and the Civil Service will have necessarily to heartily co-operate. After reading the Civilian's letters in this little volume, no one will say that his brethren in the service will stand in the way of constitutional development in India. We say this despite the strong criticism put forward in this book about the Government failing to consult service views in this matter (see p. 22). The Civilian writer resents the inference that the members of this service are "so small minded as to think only of our own interests when we should be building a constitution."

Essays on Indian Economic Problems—

By Brij Narayan, M. A., Professor of Economics, Sanatana Dharma College, Lahore.—The Panjabee Press, Lahore. Price Rs. 2-5-0.

This is a reprint in part of articles on Economic topics contributed by the author to various Indian periodicals. The war bulks large in the volume. That is justifiable because of its effects on the finance, commerce, and the general well-being of the country. Professor Brij Narain elucidates the various topics he touches on by a wealth of carefully chosen facts and figures. There are some useful charts to illustrate the points urged. We have noticed a few printers' errors, which we have no doubt will be rectified when a new edition is called for. The book ought to prove useful to both students and lay readers.

Eastern Exchange, Currency and Finance—By W. F. Spalding, Fellow of the Royal Economic Society (2nd Ed.) Sir Issac Pitman & Sons, Ltd., Amen Cornor, London, E.C. 4.

That a second edition of Mr. Spalding's book should have been called for within a year of the first shows how well it fills a desideratum. Mr. Spalding deals specially with the Economics of Eastern banking. He brings out in a strikingly telling manner the somewhat intricate subject of Eastern exchange. He shows more clearly than any writer we are aware of the process by which the financing of imports and exports by means of bills of exchange and similar credit instruments is managed. Mr. Spalding's practical experience has enabled him to produce a book which ought to be useful to both the general and the commercial public. We would like to see the book receive attention at the hands of the Boards of Studies in Economics and Commerce of the various Indian Universities. A book like this, thoroughly practical and informing, and yet written within limits, ought not to escape their notice.

Miscellaneous.

We have received from Messrs. W. T. Bush & Co. Ltd., London, a copy of the *Perfumery and Essential Oil Record Year Book and Dairy for 1920.*

As usual it is neatly and carefully got up, the literary contents being up-to-date and accurate. The perfumery trade in India is a daily growing one and no one interested in it ought to be without a copy of this year book.

The C.L.S. for India, Madras, has sent us a copy of Rev. Mr. Bogg's *Useful Information for Missionaries*. (Price as. 12) It contains a variety of useful information which ought to be helpful to missionaries and others who have to turn their hand to many different things in out of the way places.

Messrs. Ganesh & Co., Madras, have sent us a copy of Sir John Woodroffe's *Is India Civilized* (Price Rs. 2-8-0). In this the learned author states the main principles of Indian civilization. Though controvertial in one sense, it is full of shrewd reasoning. Messrs. Ganesh & Co., have also sent us copies of the following:—Mr. J. H. Cousins' *Moulted Feathers*, which has enshrined in it some excellent verse and *Footsteps of Freedom* which is a topical study which ought to appeal to many people in India; Mr. Ghandi's *Indian Home Rule* in which the author shows how the law of love is the law of life; and Mr. S. Satyamurti's *Rights of Citizens*, which is a plea for the abrogation of laws restricting the liberty of the subjects in India.

ACKNOWLEDGMENTS.

Report of the Madras Salaries Committee—Superintendent, Government Press, Madras.

Year Book of the Madras Agricultural Department for 1919.—Superintendent, Government Press. Price 12 annas.

Proceedings of the Third Annual Conference of the Indian Economic Association.—S. P. C. K. Press, Vepery, Madras. Price Rs. 2. [Copies to be had of Hon. Treasurer, Madras Section of the Indian Economic Association, Victoria Buildings, Commander-in-chief's Road, Egmore, Madras.]

Administration Report on Railways in India for 1918—19. Volume I Report and Volume II Appendices. Government Central Press, Simla. Price, Vol. I Rs. 1-8-0; Vol. II Rs. 2-4-0.

The Commercial Museum and Commercial Library, being Supplement to the "Indian Trade Journal," April 23, 1920. Published by the Commercial Intelligence Department, 1, Council House Street, Calcutta. Printed by the Superintendent, Government Printing, India. To be had gratis.

The Villager's Calendar for 1920-21.—Published by the Agricultural Department, Madras. It is replete with technical statistical information, of inestimable value to the agriculturist. pp. 91. Price 1 anna.



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MYSORE ECONOMIC CONFERENCE.*

BY SIRDAR M. KANTARAJA URS,
B.A., C.S.I.,

Dewan of Mysore.

IT is my privilege to welcome you to this the Eleventh Session of the Economic Conference. We meet for the first time after the Conference has been re-organized and certain important changes have been made in its constitution. The Session of the Representative Assembly has just closed. Some of you are here as elected members of that Assembly. Being concerned with the general interests of the people, that body has to deal with many questions in common with you. The object of this Conference is to give you, as representing the most important economic interests in the State, an opportunity to bring to bear on your special subjects, your expert knowledge, practical ability and experience and help the Government and their officers in formulating a comprehensive policy.

The Conference, as first established, was intended to provide the State with an organi-

*Speech by Sirdar M. Kantaraja Urs, B.A., C.S.I., Dewan of Mysore, in opening the Eleventh Session of the Mysore Economic Conference, held on 1st June, 1920.

zation consisting of officials and non-officials interested in the economic development of the State, to study economic questions and frame schemes of improvement. There were three Central Committees consisting partly of members selected from the Economic Conference and others nominated by the President. The functions of these bodies were to be more or less advisory, though the Central Committees had authority to a certain extent to work out schemes experimentally. In the districts there were special committees consisting entirely of nominated members. In their eagerness to show practical results, both the General Conference and the Central Committees had, to a certain extent, swerved from their original advisory character, and there was in consequence considerable overlapping of functions and want of proper co-ordination between the several agencies.

The General Conference will henceforward not be concerned with any specific schemes of improvement. Meeting on the auspicious occasion of His Highness' Birthday, the public will, through its representatives, be taken once a year fully into confidence, as to the policy that will be adopted with regard to economic development in the State and given an opportunity to review the work done and make suggestions as to the lines of future development. The Central Boards will continue to work as permanent agencies, in close association with the departments concerned throughout the year, in

studying details of schemes and seeing that continuous attention is paid to questions of economic development.

WORK DONE DURING THE YEAR.

The reports of the work done by the Central Boards, the Departments concerned and the District agencies have been placed before you. The central organizations have shown considerable activity. In the districts, the first advance was made during the year towards effecting a transfer of the functions to local bodies and this has resulted in a certain amount of slackness during the process of transition.

The Department of Industries was engaged during the year in improving the Central and District Workshops, in developing the Soap, Metal and Weaving Factories and carrying on investigations into the possibilities of the manufacture of porcelain, chamois leather and glass. Besides furnishing advice on applications for loans for industrial enterprises, the most important schemes investigated by the Board of Industries are the revision of the rules relating to the grant of financial assistance to industries and the possibilities of certain mineral industries. The Board of Research devoted its attention during the year to the selection of problems relating to chemical industries in the State to be taken up immediately for investigation and the necessary preliminary arrangements to be made in that connection.

Two special committees were appointed during the year, one for working out the details of the scheme of an Industrial Investment and Development Fund sanctioned last year and the other for the further development and organization of the Mysore Bank in order to enable it to meet the demands of trade and industries in the State in a larger measure.

The Department of Agriculture has, in addition to a great deal of useful scientific work, carried on operations on a large scale for the supply of good seed, chiefly ragi and

sugar-cane and improved ploughs and implements. It is also engaged in constructing a plough suited to local requirements. The purchase of an Austin Motor Plough with a view to test and demonstrate its utility to the ryots has been sanctioned. A Live Stock Expert has been appointed. It is proposed to organize special measures for the improvement of cattle and sheep breeding and dairying during the year.

In the Chemical Section of the Department, which is now under the direction of an Agricultural Chemist trained in Europe, important pot-culture experiments are being arranged for. The Senior Assistant Entomologist and the Senior Assistant Mycologist have been deputed for foreign training. Additional accommodation is being provided at the Hebbal School for opening Vernacular Classes in Agriculture. The Departmental staff is being suitably strengthened to facilitate demonstration and propagandistic work on a larger scale.

A Japanese Expert was engaged during the year for the improvement of Sericulture and the development of that industry both in regard to the increased production of cocoons and the better reeling and utilisation of the silk is receiving special attention.

The Agricultural Board has prepared final schemes for the relief of agricultural indebtedness in the Malnad, settlement of criminal tribes, increase of food cultivation, provision of land for the landless classes and the development of tea cultivation. Special measures were adopted during the year for the development of industrial and agricultural co-operation and for popularising the movement among the depressed classes.

In regard to Education, the year was mainly occupied in preparing the ground for carrying out the reforms embodied in the Education Memorandum. The Education Board besides devoting considerable attention to the examination of the proposals contained in the Memorandum and the revision

of the grant-in-aid Code, has dealt with the question of religious and moral education, the improvement of physical training, the provision of play-grounds and the systematisation of scholarships.

Though prices have been ruling high for some time past and the year was a remarkably prosperous one for agriculturists and some of the measures adopted by the Department such as introducing improved strains of ragi, sugar-cane and paddy and of improved implements are beginning to produce their favourable effects on the yields of crops, the condition of agriculture has nevertheless remained more or less stationary. With the exception of a few notable instances of individual enterprise, the State has not shared in the industrial awakening that has marked several other parts of India. Trade on the other hand due however to conditions common to the whole of our Peninsula shows improvement. There are signs of an increasing accumulation of capital chiefly in the hands of agriculturists and persons engaged in trade. With all these advantages, it is disappointing that the people, in spite of our efforts, should not have been able to derive much benefit from the present favourable conditions and the industries of the State have made no marked advancement. The question of the improvement of the Industries and Commerce Department so as to enable it to promote the development of industries and trade in the State more effectively and the means to be adopted for starting certain large industries for which the State possesses special facilities such as Sugar Factory, Cotton and Woollen Mills, Silk Filatures, Oil and Paper Mills are now under the consideration of Government.

WORK FOR THE FUTURE.

We are now passing through very critical times. There is a keen struggle throughout the world to re-adjust the whole social and industrial system to the new ideals and condi-

tions resulting from the war. Every country is making strenuous efforts to stimulate its production and gain a leadership in trade, in order to be able to meet the enormous demands made upon its financial resources by the pressure of national debts and the need for rebuilding the entire national life on a better and more abiding foundation. How to increase the character and quality of our production so as to raise the general standard of wealth and the material condition of the workers and help the people to bear the burden of increasing prices, the best means of adjusting the demands of rural development with the urgent necessity for the increase of manufactures, how to deal with the important questions of finance, education, health and housing from the standpoint of sound social and economic progress, are problems that we are called upon to face equally with other countries and on our capacity to solve them depends the happiness and prosperity of the people.

I shall now refer to a few facts to show how vast the field is, that we have before us, for our own work and how easy it should be to show tangible results.

The total area of culturable waste in the State is more than 8,800,000 acres. Even as regards lands under cultivation not more than 10 to 15 per cent are cultivated up to the best standards known in the State itself. Large areas of land which are locked up as gomal and included in date groves, Amrit Mahal Kavals and other reserved areas can be made available for cultivation, if only the requirements for these purposes are carefully investigated and fixed on a proper basis.

The innate abilities of the people are allowed to run to waste for want of proper education. Nearly 94 per cent of the population is illiterate. The number of persons educated above the Lower Secondary stage forms less than one per cent of the whole population and the bulk of these have received only literary education. The number of skilled workmen is small. There are very

few persons who have been trained to handle machinery and still fewer, those who can organize or manage large business concerns.

There are large portions of our forests that are suited for growing commercial crops such as tea, coffee, rubber, camphor, etc., and other areas are available for starting timber and other plantations, which are now lying unutilised for lack of enterprise. The total number of concerns employing more than 5 persons is 70 and of persons employed directly or indirectly in industrial occupations is 1,55,877. The total number of Joint-stock companies in the State is 76. These have a total capital of about 75 lakhs of rupees. Of these companies, if we exclude such organizations as the Bank of Mysore, the two Cotton Mills, the remaining concerns are not of any great importance. The total rail-borne trade of the State including imports and exports is roughly 20 crores of rupees. There are not sufficient financial facilities for trade or industries on a large scale in the State.

The total value of raw materials now exported that may be utilised for industrial purposes within the State such as cotton, oil-seeds, hides and skins, silk and silk-waste, tanning materials, amounts to nearly 2½ crores of rupees. In addition to gold, minerals of the value of 2 lakhs of rupees are sent out of the State. Much of the mineral wealth of the country remains undeveloped. Our forest resources are neither adequately conserved nor utilised. Nor, in spite of the increasing scarcity of fuel and timber throughout the State have we taken any steps for the systematic growth of masses of trees for profit on waste lands and other unutilized areas. Though several parts of the State are suited for growing commercial crops such as sugar-cane, cotton, mulberry and tobacco, the area now occupied by these crops is less than 20 per cent of the lands suitable for such purposes.

The value of the crop produced on one

acre of dry land in the State is about Rs. 15 and of wet land about Rs. 30. Comparing even within the State, the average yield of crops on the same class of land under the best methods of cultivation prevailing in the State is three to six times as great as under ordinary methods. The profits from agriculture alone could be easily doubled almost immediately even though the people follow their own old-established methods but pursue their occupations with greater intelligence and have more facilities to obtain capital. The minor industries are in a most primitive condition. Neither the number of workers nor their earning power shows any marked change from year to year nor are any attempts made to introduce new industries. The producers have no organization to market their products and are unable, unassisted, to profit from the high prices and introduce improvements in their handicrafts. Though there is great scope for such large industries as cotton, silk, paper, woollen and oil mills, sugar factories, manufacture of leather, essential oils, medical preparations, etc., and the State has much mineral wealth, water and other sources of cheap power supply, it has failed to take the lead given to it by its abundant material resources.

Owing to the large range and variety of subjects to be dealt with, the work of the Economic Conference has suffered from some discursiveness in the past. My object in repeating well-known facts on this occasion is to impress upon the departments and the agencies connected with the work of economic development, the great scope there is for framing their programmes in such a way as to be able to show immediate practical results. Now that the ground has been thoroughly cleared, our attention should hereafter be concentrated mostly on questions of immediate practical importance to the State and our efforts turned into directions that would enable us to show a steady advance from year to year.

FINANCING THE WORK.

Our chief problem with regard to our further development is one of finance. Our total expenditure on education 10 years ago was Rs. 10 lakhs; 5 years after, it rose to Rs. 15 lakhs. The present year's budget provides for an expenditure of Rs. 37 lakhs for the department and of Rs. 7 lakhs for the University. Similarly, the expenditure under the various heads comprising agriculture in the budget has risen during the past five years from Rs. 3½ lakhs to about Rs. 7½ lakhs.

A sum of 3 lakhs of rupees is spent by the department of Industries and Commerce to meet the cost of establishment, experimental and other work, in addition to the capital and revenue account of concerns worked by the department on commercial lines. A sum of one and one-sixth lakhs of rupees is spent by the department of Co-operation and of two lakhs of rupees by the Economic Conference and its several agencies. In round figures, we spend nearly 60 lakhs of rupees every year for the advancement of education and other measures relating to the economic development of the people. Having regard to our present financial resources, this forms a very liberal contribution out of our revenues and further addition can be provided only by increasing our resources. It is therefore incumbent on the departments and agencies concerned to regard the most advantageous investment on behalf of the people and while every freedom should be allowed to them for spending money for useful experiments and for educating the people, they should be bound to justify each item of expenditure by the results they are able to show in increasing the productive capacity and efficiency of the people. They should also realise that further increase of expenditure in the departments will be entirely determined by the additions they are able to make to the resources of the State and the success of their efforts in increasing the earning power of the people.

In conclusion, let me commend to you the following remarkable passage from a well-known authority on economics which aptly sums up the principles that should guide our work :—

“No utilisation of waste gases in the blast furnace can compare with the triumph of making work for the public good pleasurable in itself and of stimulating men of all classes to great endeavours by other means than that evidence of power which manifests itself by lavish expenditure. We need to foster fine work and fresh initiative by the warming breath of sympathy and appreciation of those who truly understand it; we need to turn consumption into paths that strengthen the consumer and call for the best qualities of those who provide for consumption. Recognising that some work must be done that is not ennobling, we must seek to apply the growing knowledge and material resources of the world to reduce such work within narrow limits and to extirpate all conditions of life which are in themselves debasing. There cannot be a great sudden improvement in man's conditions of life; for he forms them as much as they form him and he himself cannot change fast; but he must press on steadfastly towards the distant goal where the opportunities of a noble life may be accessible to all.”

The report of the Bombay Industries department regarding the development of the dairy industry in India says that in dairying there is a distinct chemical side which awaits development. Buffalo milk yields a large quantity of fat and, after this has been removed, the separated milk can be used for the preparation of casein, and also milk sugar, the technical applications of casein being almost unlimited. The Casein Company of New York alone would monopolise all the casein produced in India.

AGRICULTURE IN THE PUNJAB, 1918-19.

BY "RUSTICUS."

THE Report on the work of the Agricultural Department in the Punjab for 1918-19 is, for the first time, divided into two parts. The first of these contains the report of the Director, Mr. S. M. Jacob, I.C.S., and brief summaries of the work of the agricultural experts contributed by themselves. The second contains technical discussions and the data of the experimental work of the year. We propose briefly to review the first part only as this alone contains far more matter than we have space to comment on. Mr. Jacob mentions that he has been limited to 20 pages. He has actually confined himself to 16 only. It would have been better if he had taken his full quota for he has condensed his report to such an extent that it suffers somewhat in lucidity.

Cotton and wheat are the two principal crops in the Punjab. The spread of American cotton in the Province, which is one of the outstanding achievements of the Agricultural Department in India, is due almost entirely to the efforts of two men, Mr. Milne, the Economic Botanist and Mr. Roberts, the Principal of the Lyallpur Agricultural College and Deputy Director of the Lyallpur Circle. Mr. Milne discovered the right type of American cotton and Mr. Roberts organized the auction sales which have done so much to induce the cultivator to grow it by securing for him the proper price for his produce. Between them, they have probably put as much money into the pockets of the Punjab cultivator as would pay the cost of the Provincial Agricultural Department several times over. Last year the estimated area under 4 F. was 511,000 acres, an increase of 120,000 acres on the previous year. The Indian Cotton Committee

cautiously anticipated that there would be 465,000 acres under American cotton in the Punjab by 1920. It will be seen that this figure has already been surpassed, the reason being the rapid development of the Lower Bari Doab Canal colony which has now 235,000 acres under 4 F. or 85,000 acres above the Cotton Committee's figure. It is satisfactory to note that the advantages of sowing in lines are beginning to be appreciated both in that colony and elsewhere as this was one of the most important improvements in the cultivation of cotton suggested by the Cotton Committee. As regards the disposal of the produce, twelve auctions were held by the Agricultural Department and three by the Co-operative Department at which 120,000 maunds of cotton were disposed of at prices varying from Rs. 17-5-0 to Rs. 24-12-0 per maund. It might have been stated how this price compared with that ruling for the indigenous varieties. It is disappointing that the Co-operative Department has not been able to make greater progress in taking over the auctions from Agricultural Department, as it is very desirable in the interests of agricultural development generally that the latter Department should be relieved of this work. Mr. Roberts makes some interesting observations upon the future of these sales. He points out that, now that buyers are established at Lyallpur, auctions will be difficult to run successfully unless all growers support them. In recent years, in spite of the success of the auctions, only six or seven per cent of the crop has been disposed of by this means and it has, therefore, always been possible for established buyers to get plenty of cotton outside the auctions at cheaper rate. The best customers at the auctions have been new buyers. In the Montgomery Circle, that is in the Lower Bari Doab Colony, which is the newest of the canal colonies, auctions may be expected to find favour for some time to come but for the whole tract, Mr. Roberts considers that the ultimate

solution is to be found in co-operative sale in some form. Some of the larger growers in Montgomery have already combined to lease a factory in which to gin and press their own cotton but such a combination, unless it is very strong and can sell throughout the season, runs an appreciable risk in years of fluctuating prices. 4 F. by no means represents the last work in American cotton for the Punjab. The Indian Cotton Committee recommended that two other varieties, 280 F. and 285 F., should be given extensive trials. 285 F. is apparently proving a better cotton than 4 F. but has not yet passed the experimental stage as the Report mentions that it will be given extended trials on the agricultural station at Lyallpur. However, it is already being grown by some landholders who are satisfied that it is a better cotton than 4 F. 280 F. is being dropped as it has proved a lower yielder than 4 F. and has a smaller percentage of lint to the total outturn of seed and lint.

Punjab 11 continues to be the most popular of the varieties of wheat given out by the Agricultural Department in the Punjab. This is, we believe, a variety selected by Mr. Milne but the problem here was different from that in the case of cotton as this was the wheat which already constituted 80 per cent of the varieties existing in the canal colonies before the work of the Agricultural Department began to take effect. That work was, therefore, to substitute it for the mixed types previously prevalent. In 1918-19, Punjab 11 was grown on just over 300,000 acres and on the assumption that it gives one maund an acre more than the mixed varieties it replaced, this meant that the canal colonies produced 60,000 maunds more wheat than they would have done without the distribution of pure Punjab 11. The variety of wheat known as 8 A. has been extensively tested and appeared likely to prove a better wheat than Punjab 11 but, on the Lyallpur farm last year, the latter for the first time for four years beat it in point of outturn so

that the problem stands where it did five years ago and further extended trials will be necessary before 8 A. can be recommended as an improvement on Punjab 11. The result of an investigation carried out by Mr. Milne into the milling and baking qualities of seven Punjab wheats, Pusa 12 and a mixed sample was that 8 B. headed the list closely followed by 8 A. with Pusa 12 last. These results differed greatly from those obtained in previous year by Mr. Humphreys, a well known authority, when 8 B. came first followed by Pusa 12, and they cannot, therefore, be regarded as final.

The Department has been so fully occupied with work on wheat and cotton that it has been able to do little for other crops. Some work has been done on dates, olives and potatoes but the cane crop, apart from tests of different varieties on the Gurdaspur farm, has received little attention though it is a crop of considerable importance in the Punjab. It need hardly be said that the reason is insufficiency of staff but this should soon disappear. The Agricultural College will, it would seem, shortly have a second Economic Botanist, a Professor of Rural Economics, a Soil Physicist, a Bacteriologist and an Agricultural Chemist. An Entomologist was added during the year. An increase in the number of Deputy Directors from three to six is also foreshadowed in the Financial Commissioner's review.

Mr. Jacob has been unable to translate the results of the work of the Agricultural Chemist on land reclamation, green manuring or nitrogen fixation into language which permits it to be understood by the layman and the only point which need be noticed in regard to it is that the Narwala farm of 130 acres which was reclaimed from saline efflorescence by the late Dr. Barnes and handed back to the owners after three years' work is showing signs of relapse though the efflorescence has so far only re-appeared in about two acres. The deterioration is

apparently due to the fact that the land has not been given water in anything like the quantity used by Dr. Barnes. Mr. Jacob remarks that it will be interesting to see whether deterioration will continue if only a normal water-supply is given to the land. What is an interesting case to the doctor does not always present itself in the same light to the patient and anxiety rather than interest will, we imagine, be the predominant feeling in the minds of the owners of the farm.

As was the case throughout India, the sale of imported agricultural implements in the Punjab received a severe set back in 1918-19 owing to the rise in prices. 396 only were sold against 1,863 in 1916-17. However, about 750 implements, mostly bar harrows, drills and Lyallpur hoes, manufactured by the Department itself were disposed of in addition. The material of the bar harrows alone costs Rs. 12 apart from the cost of manufacture but they are sold at Rs. 10 so that it is not surprising that they are popular. Mr. Jacob proposes to raise the price as soon as they are well established. This is obviously the correct course as it is desirable that the private manufacturer should be encouraged to enter the market.

It is not so many years since there was not a single student in the first year's course at the Lyallpur College. Last year there were 265 applications for admission to 56 vacant places and for the first time the applications from agriculturists exceeded those from other classes. This is all to the good and it is even better that the demand for the services of the men who have passed through the College should exceed the supply as this is the best possible evidence that the men turned out is satisfactory. It would have been of interest to know how large a proportion of the men who have been trained at the College are managing their own lands. In addition to the regular college course of four years' duration, numerous other courses are held at the College, a Vernacular course

taken by 32 students, a rural economy class attended by 13 Revenue and Irrigation officers and a short farmers' course of ten days' duration at which the main subject of instruction was the handling of the implements turned out at the farm. The College is, therefore, as it should be, the centre of the agricultural life of the Province.

There is much else in the Report, notably the discussion on the value of demonstration farms, on which we should have liked to comment, did considerations of space permit. We are glad to see that the work of issuing crop forecasts has been taken over by the Agricultural Department from the Department of Land Records. A word must be said in conclusion about the most interesting experiments in making a rapid crop survey by means of aeroplane photography. A series of photographs of an area under crops in a village five miles south of Lahore was taken from heights varying from 3,000 to 13,000 feet but unfortunately the cameras used were not of the best type. Even so, it was found that crops of cane were perfectly distinguishable at 10,000 feet. At that height senji (a fodder crop) and wheat were often similar in shading but the fields of senji could frequently be distinguished owing to the irregular patches where the crop had been cut for fodder. Gram was too thin and struggling to be very different from a field of fallow. A fresh series of photographs with better cameras is being arranged for. Cane, cotton and wheat are the principal crops and cotton and cane present no difficulties. Wheat does but Mr. Jacob is hopeful that these will be overcome. If this proves possible, Mr. Jacob holds that a series of aeroplane photographs will give a basis for forecasts of the areas under each crop which could not be surpassed. The experiment certainly furnishes evidence of what is apparent throughout the report that the Punjab Agricultural Department is keeping abreast of the times.

INDIAN CURRENCY AND BANKING.

BY PROF. V. G. KALE, M.A.

MR. G. Findlay Shirras is too well-known to the reading public as Director of Statistics with the Government of India, to require any introduction. In that official capacity, he has introduced a number of important improvements in the method of presenting statistics to the public from year to year. The reports, reviews and statements which he has been publishing, have become instructive to those who are interested in a study of statistics relating to the economic development of India. Like the few officials who are not content with the mere routine of their departments but love to go behind the facts and the figures they have to handle, Mr. Shirras has laid down the practice of interpreting his statistics and placing them before the public in such a way that a similar interpretation may be facilitated in their case also. Officials like him have this advantage of securing access to facts and figures which are not easily available to the ordinary student. We note that Mr. Shirras was a reader of Indian Finance and Currency in the University of Calcutta in 1914, and remember having read newspaper reports of the lectures he delivered in that connection on Indian banking. We then thought that a book from his pen on those subjects, would prove valuable and we are glad that he has produced a volume* on Indian Finance and Banking for public benefit. Mr. Shirras has written the book, of course, in a non-official capacity and the views expressed by him are in no way, official views. Indian Currency is a large subject, not easy to handle, but with his large experience and acknowledged capacity, Mr. Shirras was

expected to tackle it with success. And the expectation has not been disappointed.

Indian finance, currency and banking have been recently undergoing such rapid and far-reaching changes that a book on those subjects must get out of date in the course of a single year. Mr. Shirras, however, had this advantage that he wrote the volume under review after the country had gone through the most extraordinary experience of war conditions, though the Babington Smith Committee's report was not available to him and the peculiar conditions which have led to the sale of reverse councils on a large scale during the past four months in the face of strong public opposition, had not then arisen. But Mr. Shirras's book does much more than giving an account of the leading events which occurred in the realm of Indian finance and currency during the time of war and pointing out their significance in the way of their far-reaching effects. The historical portion of the book and the discussion of fundamental principles and practices underlying the Indian system of finance and banking is not the least instructive part of the volume. It carries forward the work done for students by Prof. Key and Mr. H. F. Howard and executes the task in a more comprehensive and thorough-going manner.

Beginning in the introductory chapter with a brief exposition of the main features of India's balance of trade, the book proceeds to describe the country's currency system as it existed before the war. This introduction prepares the reader for an account of the way in which the system was affected by war conditions. The years of war fall into two well-marked periods, the first from 1914 to 1915, and the second from 1915 to 1919. The description of the developments which took place in the second period, leads the author to a discussion of some highly interesting questions such as the fixing of the exchange and the suitable rate for the same.

* *Indian Finance and Banking* by G. Findlay Shirras, Macmillan & Co. Ltd. Price Rs. 18.

Mr. Shirras examines the various proposals that have been made to stabilize the rupee for instance, fixing it at a low rate and facing temporary inconvertibility to maintain it in emergencies. He is strongly opposed to inconvertibility as being 'altogether outside practical politics in India' as he is opposed to the 'debasement' of the rupee and he thus anticipates the verdict of the Currency Committee in that regard. The lessons that he derives from the experience of war time are (1) the value of liquid gold in reserves, (2) the importance of imports of treasure, especially gold, in the liquidation of India's favourable trade balance, and (3) the necessity of large rupee balances to meet abnormal strain and they are important lessons that must be taken to heart.

Mr. Shirras feels satisfied that the Indian currency system has been developed, on the whole, on right lines and that much of the criticism passed against it, is unjustified. He regards India's gold exchange standard as 'an improved gold standard' and has no patience with those critics who, like Professor Nicholson, are inclined to think that it is an imperfect standard, or in fact, is no standard at all. Security and elasticity are two attributes of an ideal currency and the Indian system, according to Mr. Shirras possesses them in a large measure as was proved by the experience of the war period. Mr. Shirras' characterization of the view of hostile critics as misleading and mischievous, leaves us unrepentent. He and those who think with him, would father upon India an 'ideal' and 'improved' system despite the peculiar conditions which prevail in this country, militating against the adoption of the exchange standard. The large favourable trade balance that India has from year to year, the demand of her people for gold in large quantities for social and other uses, the ignorance and other backwardness of the masses are factors which have to be taken into account in pronouncing upon this question. Free trade is an ideal thing, but

India does not want it and even England is trying to abandon it. Bimetallism is an ideal system, but England has never favoured it. Systems may be ideal but they must be suited to a country's economic, social and political conditions. Mr. Shirras complains of India's heavy absorption of gold but the currency committee has shown a better appreciation of the causes and the value of this phenomenon. The world wants India's raw materials even at high prices and cannot make full payment for them in commodities. And the balance has to be remitted in the form of the precious metals as it cannot be accumulated abroad beyond a certain limit. There is no escape from this position and the exchange standard far from providing a remedy, aggravates the difficulty. In a later chapter, Mr. Shirras observes as follows concerning the position of gold in the Indian currency:—"The most suitable media for internal circulation are rupees and notes, especially the latter; for the settlement of our external obligations, we should turn to mobilise gold reserves, by means of which so much of the internal currency that seeks export may be converted quickly and without difficulty into sterling." And he quotes with approval Mr. D. M. Dalal's remarks made in March, 1919, concerning the conservation of gold in India. Little did Mr. Shirras dream of the severe strictures that Mr. Dalal has passed against the gold exchange standard policy of government during the war period!

We cannot commend too highly the author's narration of the history of Indian currency through the different periods and his most illuminating chapters devoted to the exposition of the paper currency, the gold Standard Reserve, council drafts and the balances of the Indian Government. Equally instructive is his account of the Indian banking system in all its aspects and the effects of the war upon the position of the banks. The requirements of the immediate

future with respect to sound and extensive banking in the interests of the rapid economic development of the country, have been clearly shown and the situation in India is compared with that of other countries. The numerous statistical tables which have been introduced into the body of the book are exceedingly helpful in illustrating and driving home the points sought to be made by the author. The tables appended at the close of the volume supply valuable material to the student not only in regard to Indian currency and banking but the general economic condition of the country—a setting which makes the main features of the picture highly vivid and impressive. Mr. Shirras has produced a book which will be found to be eminently suited to the needs of the student who wants other highly technical subjects of Indian currency and banking treated in an instructive and easily intelligible way. The book may be profitably studied by the general reader and may be used by University students as a text-book. It fulfills both these requirements in a remarkable manner and we congratulate Mr. Shirras on having satisfied a badly felt want.

The introduction and maintenance of the best strains of cotton was one of the most valuable activities of the Bombay Agricultural Department during 1918-19, and the growing of selected strains and the distribution of seed through selected agencies continued. H. E. the Governor in Council in their Resolution on the Report of the Department, observes with satisfaction the efforts made in Gujarat to combat the spread of inferior cotton and the threatened extinction of the best Broach varieties. A special staff has been appointed to carry out these operations, and it is satisfactory that the trade has lent its support and co-operation which, it is hoped, will continue.

EMPIRE COTTON.*

ON the 25th July, 1917, a Committee, under the chairmanship of Sir Henry Birchenough, Bart., K. C. M. G., was appointed by the President of the Board of Trade to "investigate the best means of developing the growing of cotton within the Empire, and to advise the Government as to the necessary measures to be taken for this purpose." It was a strong and representative Committee, consisting of twenty-one members appointed by the Board of Trade; seventeen of the members were nominated by Government Departments, trade associations, and other public bodies. The recommendation that the Empire Cotton Growing Committee should be set up was made by the Departmental Committee on the Textile Trades, and this recommendation was supported by a Memorandum to the Prime Minister from the British Cotton Growing Association and other bodies, including the Liverpool and Manchester Cotton Associations, and all the Associations of employers and employed in the cotton Industry.

It was pointed out that (1) The world is short of cotton, and the shortage is increasing. (2) The shortage is greatest in the finer kinds of cotton which Great Britain uses so largely, and is generally more serious for Great Britain than for any other country. (3) Eighty-five per cent of the cotton used in Great Britain comes from the United States, which every year itself consumes more of its own cotton. (4) The British Empire can (with proper development) grow the quantity and quality of cotton that it requires. (5) Cotton growing brings prosperity to the places suited for it.

It was also suggested that there was a wide sphere of work which needed to be done by someone, and which could only be done

*With acknowledgments to the *Board of Trade Journal*.

quickly with Government assistance. It was argued that it was the business of each Colony or Protectorate to decide for itself whether its climate, soil, population and means of access to markets were suitable for cotton; also that it was the business of each Colony to decide what kind of cotton it was most profitable to grow, to try experiments, to control the industry, and to provide the necessary transport and other facilities when cotton was shown to be profitable to the Colony. Finally, it was suggested that great advantages would arise from the creation of some kind of Central Committee or Department in the Imperial Government to advise and assist in connection with all measures which had to be taken, and in particular, to bring all the resources of science into play to promote the extension and improvement of cotton growing.

THE GENERAL SITUATION.

All the investigations that the Committee have made tend to confirm the statements made in this Memorandum. There is no doubt about the shortage of cotton, nor as to its importance to Great Britain and the British Empire. Since July, 1917, the situation has become decidedly worse. Owing in part to the necessity for growing more food stuffs to meet the needs of the war, the cotton crops in the United States, in Egypt and in India have been curtailed. Moreover, the seasons have been unfavourable, and the present season is giving rise to fears that the crops both in the United States and in Egypt will again be deficient. The advent of peace has in no way improved the situation. There is evidence of a world shortage of cotton goods, and there is no prospect whatever of there being a full supply of cotton for some years to come. Prices of cotton are already at levels far in excess of anything recorded since the cotton famine in the sixties. The Committee also find themselves able to endorse generally the opinions in the Memorandum.

They are confident that if proper measures are taken, it should be possible to grow within the Empire at any rate a very large proportion of the cotton it requires. They are convinced that in many parts of the Empire cotton growing will greatly increase the prosperity of the colonies which grow it. As will be seen in Part II, this has already happened in St. Vincent and in Montserrat, and is taking place to a remarkable degree in Uganda. Further, they concur generally in the suggestions made in the Memorandum, and think it very necessary that the Committee should be empowered to advise and assist in all measures to be taken for the promotion of cotton growing.

The Report of the Empire Cotton Enquiry Committee which has now been issued (Cmd. 523, 1s. 6d. net) is in two parts, Part I giving the general views of the Committee, and setting forth their general plans and proposals for the future; Part II containing a detailed survey of the various territories of the Empire which are considered suitable for the cultivation of cotton.

PART I.

THE PROBLEM TO BE SOLVED.

The problem before the Committee was the adequate development of the Empire's resources for the production of cotton. Its solution appears to depend on the proper handling of three main questions.

- I. The acquisition of necessary knowledge, and the supply of men to apply that knowledge.
- II. The establishment of efficient arrangements for (a) controlling the growing of cotton crops, and (b) marketing the crops, when grown, so as to secure the best possible results for the growers.
- III. The provision of the necessary funds.

THE ACQUISITION OF KNOWLEDGE : A CENTRAL RESEARCH INSTITUTE.

It is urged that the foundation of all agricultural progress must be based on science. Research is required not only into the true relation between the characteristics of cotton lint and the qualities of the finished article, but is also urgently needed into the principle underlying the growth of cotton. Two branches of research are required; one into the laws of heredity and their application to the development of cotton: the other into the effects and limitations of environment. Again, the research needed can be divided into two classes in another way, for some problems are of a universal character, and some are purely local.

To carry out the research required it is recommended that at the earliest possible date a Central Institute should be established to study the life of the cotton plant and the development of its lint, from all aspects except such as are of merely local interest and profit. It is suggested that for many reasons Egypt would be the most convenient place for the proposed Institute, provided that it would be welcomed by the Egyptian Government. It would not deal with local Egyptian problems, but would be closely linked up, not only with the local research work of Egypt, but also with the local research work of all other cotton areas. Co-operation with the newly formed British Cotton Industry Research Association is intended, and a Joint Committee has already been appointed.

THE APPLICATION OF KNOWLEDGE.

Very great emphasis is laid on the need for making great additions to the Agricultural Departments of all British Colonies and Dependencies, particularly where cotton can be grown. The Committee have great pleasure in reporting that the Colonial office has recently, on their recommendation, appointed a Committee (1) to consider the question of Agricultural Departments in the territories for

which it is responsible, and (2) to draw up a general scale of numbers of men and of suitable salaries which could be adopted as an ideal to be worked up to as finances permit and as the men can be found. The need for pioneer work is discussed. The work of the British Cotton Growing Association since 1904 is suitably acknowledged, and it is pointed out that work of this kind, that is investigations as to the prospects for cotton in fresh districts, will require to be continued for many years to come.

SCARCITY OF MEN.

This is a very important subject, and the inquiry shows that the available supply of trained men is entirely insufficient. Three classes at least are required. Men outstanding of ability to conduct pure Research, men of good scientific qualifications for direct investigations, and practical men for pioneer work and for bringing influence to bear on ordinary agriculturists. These classes are additional to administrative and executive officers necessary to secure proper control of the cotton crops under the regulations laid down by the local authority. In view of the need for so many highly trained men the Committee point out that there is a preliminary need to be supplied, and that they are advised by competent witnesses that provision must be made for more pure Research to be done at British Universities and other places in such subjects as Plant Physiology, Plant Genetics, Mycology, and Entomology. At least one Professorship or Readership in each of these sciences should be provided. In addition, provision should be made for a number of post-graduate studentships attached to these and other chairs, by means of which promising men can be trained in methods of Research. The Committee have made a small beginning by having arranged with the British Cotton Industry Research Association to co-operate in offering five such studentships to be held in the coming year. The Committee recommend His Majesty's Government to take this matter into serious

consideration in consultation with the cotton industry and many others which depend on agricultural products for their raw materials, and they also recommend that liberal contributions for this purpose should be recognised as part of the expense of increasing the cotton supply.

BUREAU OF INFORMATION.

The need is explained for a Central Bureau of information to collect and disseminate the knowledge of all matters of interest to scientific and other cotton growers. It is hoped to arrange for the publication of a Quarterly Review of Cotton Growing.

THE CONTROL OF COTTON GROWING.

The necessity is explained for strict control by Government of all cotton crops so as to secure purity of strain, which is recognised to be an essential condition of success in cotton growing. Control is wanted in other ways to combat pests which, everywhere injurious, are specially dangerous in tropical regions.

THE MARKETING OF COTTON CROPS.

The Committee explain that in the infancy of cotton development in any new district special arrangements are necessary to secure to the grower prices proportionate to the quality of his cotton. It is also pointed out that financial assistance must occasionally be afforded during the period of growing. This may sometimes take the form of fixing prices ahead, in others it may be necessary to make monetary advances against the crop. For all such work it is felt that some agency independent of Government will be needed, and it is recommended that an agreement should be made with the British Cotton Growing Association, subject to that body foregoing commercial profits and being guaranteed against loss on this part of the business.

PROVISION OF THE NECESSARY FUNDS.

It is in the first place pointed out that apart from the large capital required every year to finance and market the crop, promo-

tion of cotton growing will involve the expenditure of a good deal of money. Some forms of expenditure have already been indicated. There are also many other matters often of pressing importance for which a large amount of money will eventually be required. The great need in almost every Colony or Protectorate is for better transport facilities. Roads, railways, water communications and harbour works are almost everywhere demanded. There are also in many places present or prospective needs for irrigation and drainage.

ALLOCATION OF FINANCIAL RESPONSIBILITY.

The Committee state the broad principle which in their opinion should be recognised in allocating the responsibility for raising the necessary money. They recognize the claims on the Imperial Government for assistance to the Colonies in raising money for development purposes; they also feel that a strong case can be made for appealing to the British Treasury for support to be given in some proportion to the efforts made by the Cotton Industry itself to pay for the unremunerative work which will be necessary to secure the satisfactory supply of its raw material. But the immediate object of the paragraph must be stated in extenso; it runs:—"At present our object is to distinguish between the responsibilities for expenditure on the part of the cotton growing colonies, and the cotton using industries, and to establish the principle that while expenditure which directly benefits the general interests of a colony should be borne by the colony itself, the cost of promoting the cultivation of cotton in preference to other crops should be recognised as a charge on the Cotton Industry. We hope that this broad principle may find general acceptance in Lancashire and other cotton using districts. There will, of course, be many cases in which the exact application of a principle of this kind may be in doubt. In some

countries cotton is the most paying produce it is possible to grow, in others it is barely able to compete with other crops. Some colonies are better able to finance their own developments than others. In the poorer colonies, if cotton is to be developed at all, assistance must be given from the outside. Further, if the principle we have enunciated is accepted, we feel that it will be fair to urge that wherever the Cotton Industry is willing to make special efforts to promote cotton growing with the approval of this Committee, the local Government concerned should upon its side do all that it possibly can to provide sufficient means of transport and communication and other necessary adjuncts."

FINANCIAL REQUIREMENTS OF THE EMPIRE COTTON GROWING COMMITTEE.

These cannot as yet be accurately estimated. An annual income is required for establishment expenses, and for a small amount of preliminary work. In addition the following headings are suggested which have already been partly explained.

(i) Research Work.—For the Central Institute for Research it is suggested that it might begin with four men of science with the necessary European and native assistance, and with at least four younger men qualified for carrying on independent research under supervision. It is mentioned that the funds for this can either be provided by the Empire Cotton Growing Committee, or by the Cotton Industry Research Association. Both bodies are in an early stage of development, and friendly discussion will be required. But in any case very considerable expenditure is required, and will certainly bear fruit in largely increasing the wealth of the Empire.

(ii) Readerships and Studentships.—It is recognised that this matter concerns not cotton alone, but most of the other textile trades, and many other industries such as sugar, rubber and cocoa, which depend on

the living plant. The Committee recommend that the Cotton Industry should include this form of expenditure in its provision of funds for cotton growing.

(iii) Practical Agricultural Work.—It is thought, that, as the Agricultural Departments of many of the Colonies or Dependencies are enlarged, it will be necessary for the Cotton Industry to finance wholly, or in part, men who are employed in the special promotion of cotton growing.

(iv) Pioneer Work will be required, and is a proper charge on the Cotton Industry.

(v) Commercial Handling will involve very considerable outlay.

(vi) Information.—Provision must be made for the necessary expenditure.

METHODS OF RAISING THE MONEY.

It is pointed out that the necessary funds cannot be satisfactorily raised by appealing for gifts and voluntary subscriptions; nor is the kind of expenditure required such as to offer any direct profits in return. The expenditure will yield profitable results, but they will accrue to the cotton growing and cotton using communities, and not to individuals. It is, therefore, suggested that a fund should be raised on the basis of some kind of a levy from the Cotton Industry. A possible plan would be to impose a small sum on all cotton imported into the United Kingdom. So small a sum as 6*d.* per bale of 500 lb would raise £100,000 per annum. Whatever plan is adopted and whatever sum is found to be necessary, it will be trifling beside the interests involved. Great Britain uses annually about 4,000,000 bales of cotton, valued at the present time at £150,000,000 and upwards. It is recognised that elasticity will be required so that the sum annually provided may correspond with the expenditure which can from time to time be justified; and also that so far as the industry provides funds the representatives of the bodies which find it must control its appropriation.

FUTURE PROSPECTS.

Part I closes with an expression of the Committee's confidence that the problem of Empire Cotton Growing can be solved. Further and more detailed enquiry will be needed ; persistent and scientifically instructed work must be done ; but success may be confidently expected.

GENERAL CONCLUSIONS AND
RECOMMENDATIONS.

The General Conclusions and Recommendations of the Committee are as follows :—

In putting forward our conclusions and recommendations we have to admit that they are to a large extent provisional in their character. We are convinced that it is possible for the British Empire to make good the world's shortage of cotton, but the one conclusion that stands out plainly and definitely as the result of our work during the past two years is that this achievement is beyond the powers of this or indeed of any Committee. It can only be accomplished by the united efforts of the Imperial Government and the Government of the cotton-growing Dominions, Colonies, and Protectorates, supported by the active interest and cordial co-operation of all who are engaged in the Cotton Industry in this country.

Our general recommendations are as follows :—

- (1) That the Empire Cotton Growing Committee be authorised to continue its work on the general lines of the present Report, and that a grant be made to it by the Treasury of a sum of not less than £10,000 per annum for five years to pay for its secretarial and other current expenses and for any outlay that proves to be necessary for initiatory work in directions connected with the objects of the Committee.
- (2) That the immediate importance of greatly enlarging and strength-

ening the Agricultural Departments of British Colonies and Protectorates be recognised as a preliminary step essential to any rapid progress, and that the Colonial office be respectfully recommended to appoint a committee to advise on the scale of numbers, salaries, and general expenditure which should be aimed at for adoption as and where circumstances permit.

- (3) That, in order to supplement the present knowledge of scientific principles underlying cotton growing, a Central Research Institute be established as soon as possible for their investigation.
- (4) That, in order to increase the supply and improve the training of scientific men, financial provision be made for at least four Readerships at British Universities in Plant Physiology, Plant Genetics, Mycology, and Entomology; that funds be provided for the awarding of Research Studentships to be held for one or two years by graduates who are selected for training in methods of research in these and other sciences concerned with the study of the living plant; the number of these to be five to begin with, but to be gradually and considerably increasing before long.
- (5) That we should establish a Bureau for the interchange of knowledge of cotton growing and should arrange for the publication of a Quarterly Review devoted to this subject.
- (6) That the Governments of all cotton-growing areas in the Empire be advised to take full powers for exercising strict control over all

essential matters connected with cotton growing.

(7) That, where it is possible and seems desirable, such Governments be recommended to establish local Associations of cotton growers to advise their Government upon matters of general interest to the industry.

(8) That an agreement should be negotiated with the British Cotton Growing Association, in accordance with which that body will act as agent for the Empire Cotton Growing Committee for marketing crops where this is desired by the local Government; that it should be a condition of this agreement that the British Cotton Growing Association shall forego the appropriation of any profits made in the business carried on under the agreement, provided that the Association is guaranteed against permanent loss arising therefrom.

(9) Finance.—That funds for the promotion of cotton growing in the Empire should be provided from the following sources:—

(a) The British Treasury.

(b) The local revenues of cotton-growing areas.

(c) The Cotton Industry.

That the following general principles be accepted as a guide in discussion and in negotiations as to the allocation of financial responsibility to each of the above sources:—

(a) That the British Treasury may fairly be looked to—

(1) To provide for the secretarial and establishment charges of the Empire Cotton Growing Committee, and for outlay for initiatory work in

directions connected with the objects of the Committee.

(2) To contribute—in some proportion to be agreed—towards expenditure upon schemes approved by this Committee which have for their object the provision of the raw material upon which the great national industry of cotton manufacture depends.

(4) To assist the Governments of Colonies and Protectorates—either by grants or more probably by guarantees—to provide funds for public works, such as railways, waterways, irrigation and harbour works, necessary for the development of their resources.

(b) That where developments, although in their inception they may be connected with cotton growing, are calculated to extend the general prosperity of a Colony or Protectorate, they should as a rule be financed by the Colonial or Protectorate Government.

(c) That where the growing of cotton is promoted in preference to other profitable crops, and where pioneer work is undertaken in order to ascertain whether cotton can be grown profitably, the consequential expenditure should be at the charge of the Cotton Industry.

(10) That the Committee be authorised to ascertain the opinion of the Cotton Trade of this country in regard to these recommendations, and in particular upon what lines effective co-operation in raising

the necessary money may be expected from the organizations in which the trade is grouped.

PART II.

SURVEY OF THE COTTON GROWING AREAS OF THE EMPIRE.

The Summary of Special Conclusions and Recommendations is as follows :—

WEST INDIES.

The crop, though small, is of world importance. We recommend that means should be provided to secure the continuance and, if possible, some enlargement of the Imperial Department of Agriculture. We also recommend that careful enquiry be made as to the best means of replacing the Sea Island crop of the United States [which is in grave danger of practical extinction].

EGYPT.

(a) The Egyptian crop before the war had reached a total of over $7\frac{1}{2}$ million kantars (or 1,875,000 bales of 400 lb.). It has, however, during the war, fallen below 5 million kantars. Having in mind this fact and the particularly serious reduction in the supply of fine cotton generally owing to the loss of the Florida and Georgia (Sea Island) crop, we regard the position in Egypt with peculiar anxiety, and desire to emphasise the necessity of leaving no step untaken to remedy the causes which have led to this decline and to attain the maximum production of which the country is capable.

(b) As quality is of first importance in fine cottons, such as Egyptian, we consider it essential that work should be directed methodically and constantly, not only towards maintaining the quality of the existing varieties, but also towards securing and holding in reserve other varieties for introduction when and as expedient.

(c) We would specially emphasise the desirability of proceeding without delay with the measures already determined upon before the war to remedy the unsatisfactory

condition of parts of the Delta as regards drainage and the control of excess water.

(d) Concurrently with the completion of these projects, it is of the utmost importance that water should be available for the reclamation and irrigation of the lands referred to as well as of those further north which will be restored to cultivation by the new drainage works. An adequate water-supply is available in the White Nile, and we trust that no time will be lost before adopting the best measures for its utilization. Until this is done full advantage of the expenditure already incurred in the Northern Delta cannot be obtained.

(e) It is estimated that the measures referred to in paragraph (d) would result in an increase of 3,500,000 kantars of cotton, or about 900,000 bales of 400 lb. The magnitude of such a possible increase in the Egyptian crop overshadows, though in no way detracts from, the importance of the prospective increase in Uganda or Nigeria, where some such figure as 100,000 bales may be expected as the result of development work.

(f) Since part of the serious reduction in the average yield of the crop is due to the devastations of the pink boll worm, we consider it essential that no time should be lost in putting into force the measures decided upon just before the outbreak of war to combat the ravages of this pest.

(g) We most cordially welcome the appointment of the new Cotton Research Board in Egypt and hope that every assistance will be given to it and to its endeavours to elucidate the problems affecting the Egyptian cotton crop, in particular (a) the environment of the crop, specially with regard to water and to the control of insect pests, and (b) the maintenance and improvement of the quality of the seed.

SUDAN.

In our letters to the President of the Board of Trade dated 29th December, 1917,

and 17th February, 1919, we referred to the importance to Egypt of the Sudan irrigation and accompanying drainage schemes; and we desire to emphasise once more the fact that the irrigation projects in the Sudan form an inseparable part of the comprehensive scheme for utilising to the fullest extent the water supplied by the Nile.

We have heard very full evidence with regard to the Blue Nile Barrage, which would make possible the irrigation of some 300,000 acres of land as a first instalment in the Gezira, with prospects of a further increase to about 1,000,000 acres suitable for cotton growing. We are of opinion that the Gezira is one of the most promising districts for development that we have had to consider; we recognize, however, that, with regard to the utilization of the Nile, the interests of Egypt have to be considered before those of the Sudan. At the same time we hope that the possibilities of opening up and developing the Tokar and Kasala areas may be carefully considered.

In the Sudan as elsewhere, we consider experimental work to be of the greatest importance. We are glad to be informed that this is fully recognized by those responsible for the Government of this important country.

MESOPOTAMIA.

We are of opinion that the results obtained by the experimental work of the Department of Agriculture are very promising. These experiments, however, were necessarily carried out on a small scale. It is, therefore, most important that the work should be continued and extended in order to determine whether cotton can be economically produced on a commercial basis. It is essential for this purpose that arrangements should be made to build up a supply of approved seed for large sowings in 1921, and we have already recommended that the funds required to make this possible should be at once provided by a special grant.

UGANDA.

We recommend that the Agricultural Department should be enlarged, and that the salaries paid to its officers should be substantially increased, so as to retain those already employed, and to attract men of ability to the service.

Continued attention should be paid to the development of transport facilities, including improved waterways.

We recommend that Government control of the Cotton Industry already established should be maintained.

NYASALAND.

We wish to emphasise the necessity here as elsewhere in Africa, of strengthening the Agricultural Departments and improving transport facilities.

RHODESIA.

We think it desirable that the possibilities of Rhodesia as a whole should be more fully explored, since, although none of the districts where pioneer work has been undertaken can be regarded as likely to produce a large cotton crop in the early future, they apparently possess possibilities for further development which may prove valuable later on.

The addition of cotton experts to the otherwise well-equipped Agricultural Department is essential before progress can be expected.

THE UNION OF SOUTH AFRICA.

The cotton-growing industry has now emerged from the experimental stage in South Africa. The results obtained indicate that cotton of excellent quality can be grown. We recommend that the valuable work done by the Department of Agriculture should be extended with the object of developing cotton growing on a much larger scale.

NIGERIA.

We see reason for hope that great expansion may be possible in the growing of cotton in Nigeria, but before this can be attained a large increase in the staffs of the Agricultural

Departments will be necessary. We have to reiterate once more the need for an increase in the salaries paid, if these Departments are to be maintained in an efficient state.

We are of opinion that progress equally depends upon the systematic development of the transport systems. Until main line railways can be constructed, we think that efforts should be made to open up the country by other means of transport. We understand that several methods have been tried, and we would press the authorities to decide upon those most suited to local conditions.

We are of opinion that the work of the British Cotton Growing Association in promoting the commercial development of the cotton crop has been very valuable.

Meanwhile, we recommend that the British Cotton Growing Association be asked to proceed energetically with its work in the areas in which it is now operating, with a view to increasing the cotton crop to the fullest extent of the capacity of the ginning and baling plant already installed, which appears sufficient to deal with a large increase upon the output of recent years. In this connection we recommend that our Committee should enter into a working agreement with the Association as outlined in Section 26 of this Report.

Exploratory work in new districts, for example, in the region of Lake Chad, appears to us desirable, and we recommend that we should assist the local Government in pioneer work.

INDIA.

Following the recommendations of the Indian Cotton Committee, which sat in 1917-18, we advise:—

- (i) That in order to obtain permanent improvements in cotton in India on a commercial scale, more detailed agricultural work, better methods of marketing and handling, and closer co-operation

between the Agricultural Departments and the Cotton Trade interests should all be promoted

- (ii) That more detailed investigations of the existing kinds of plants in cotton-growing areas and more systematic tests of different varieties should be made. The work, both of selection and plant breeding, should be conducted solely "by research officers specially qualified therefor and able to devote their full attention to it." The methods of field tests should be systematised.
- (iii) That special weight be given to (1) the importance of work directed towards the improvement of agricultural practice in its widest sense; (2) the need of staffing, organizing and equipping Agricultural Departments on a scale adequate to carry through widespread demonstration work; (3) the vital necessity of Government control in organizing the selection, supply and distribution of pure seed.
- (iv) That the recommendations to appoint an additional mycologist and to discontinue work on perennial cottons be adopted.
- (v) That the increase asked for in the staff of the Agricultural Departments, which is the minimum that can be expected to discharge the necessary duties assigned to these officers, should be granted.
- (vi) That the possibilities of the Sukkar Barrage Project be re-examined.
- (vii) That, with a view to improving the marketing of cotton, markets should be established under definite rules and regulations, and co-operative sale by the villagers should be encouraged.

(viii) That effect be given to the Indian Cotton Committee's suggestions for the licensing of ginneries and presses, and that the needful legislation be introduced. We also support their recommendation that the transport of cotton and waste be controlled.

(ix) That the proposal to form an East Indian Cotton Association be carried out, since we believe that the formation of an association on the lines indicated would be of benefit to the Indian Cotton Trade, and would be welcomed by similar organizations in other countries.

(x) That the standardization of weights on the plan suggested—namely, 28 lb. (avoird.) to the maund, 28 maunds to the khandi—be adopted.

(xi) That the recommendations for improving crop forecasts be carried out, but that in the interest of accuracy the advisability of securing returns of unpressed cotton delivered direct to mills be considered.

(xii) That the proposal to form a Central Cotton Committee, as outlined in the Report, be put into effect, and that the Empire Cotton Growing Committee work in co-operation with it wherever possible, in the interests of cotton production.

Finally, we would request sympathetic consideration for, and early action on, the various recommendations of the Indian Cotton Committee, which we consider well calculated, both to improve cotton growing in India and to promote the material benefit of that country.

The report was dated on 22nd October, 1919, and is signed by all the members of the Committee except Mr. Wadia and Mr. Kershaw, who have been absent from England during the drafting of the Report.

COMMERCE AND INDUSTRIES IN INDIAN STATES.

BY A. P. SMITH.

THE necessity for the expansion of such industries as already exist and the inauguration and development of new ones is felt as much in the Native States of India as it is felt in British India. The relationship and interdependence of territories directly under the rule of the Indian Princes and purely British territory has become so close and intimate that, progress or retardation in either is felt by the other. The war and the resulting activities of the Munitions Board clearly revealed the possibilities of industrial effort in this country, and the successes achieved, such as they were, under the pressure of compelling circumstance were so unexpected and phenomenal, that it could no longer be ignored that India, with her enormous raw produce, with latent capital only requiring to be tapped, organized agency, expert direction and cheap labour, is capable of taking a leading position among the manufacturing nations of the world. The investigations of the Industrial Commission, born of the successes and the failures of the Munitions Board's operations, have convinced the most sceptical that, although India is in the main an agricultural country, the industrial side of Indian life, so long neglected, is worth while being fostered and developed as much as possible, and that Government should, in many cases, initiate enterprise and, in all cases, encourage enterprise and establish industrial operations. Tentative efforts in this connection are slowly revealing themselves in British India, while Native States Rulers are, in consonance with the policy enunciated by the Industrial Commission, interesting themselves in the industrial and commercial welfare of their several provinces.

What Mysore has done, and is doing, is well known. Indeed, the success of Mysore in industrial activities is generally acknowledged and are in the nature of an object lesson to less progressive States. To carping critics her feverish desire to develop the industrial resources of the State, and the small degree of progress made in certain directions, the expenditure involved may appear to be inexcusable; but such non-successes are but stepping stones to eventual achievement. Be that as it may, Mysore is not the only Indian State that is endeavouring to build up new industries and to resuscitate moribund and, in some cases, defunct industries. The premier State in India in political status and extent of territory, Hyderabad, has taken some trouble to organize an industrial survey of the State and to improve that side of the life of her large population. Travancore, under Dr. Barker, is keen on industrial initiation and expansion while the northern States of Baroda and Holkar have just published—the former the 1917-18 Annual Report, and the latter a Report for the three years ending September, 1919. To notice the advance made in Baroda first: There is no necessity to mention the existing industrial concerns which appear to have maintained a steady position. It was felt last year, however, advisable to decentralize the activities of the Department of Commerce and Industries and a three-fold division of operations was decided on, under three separate officers—one in charge of Co-operation, one in charge of Commerce and Industry and, a third in charge of Statistics and Social and Economic Inquiries. Among the new industries started was a substantially supported tile and pottery works. But it is not in actual achievement that any real advance has been made, and the work accomplished during the year is by way of experiment and preparation for the future. His Highness the Gaekwar Sahib is closely acquainted with industrial and economic concerns in Europe and America

and believes more in the slow building up of economic life than in making frantic efforts to establish concerns without a thoroughly stable foundation being laid. Under Social and Economic enquiries may be mentioned the redistribution of agricultural lands, an investigation of the old trades and handicrafts of the country, which once existed in the shape of organized guilds, and which have been converted, with the decay of Indian industrialism, into Caste organizations for social purposes. The relief to old and infirm persons in co-operation with State and village panchayats, in lieu of old age pensions, is contemplated a rural survey of the country and an enquiry into the economic condition of the people are also on the tapis. The State views with favour all applications from outside for the resuscitation or creation of new industries, while invitations to capitalists outside the State to undertake industrial enterprises under favourable concessions was also attempted. Special investigation is being made in the capabilities of forest utilization, and the opening of a Forest Research Laboratory is under consideration. Loans are granted freely. Obstruction to industrial expansion occasioned by out-of-date Revenue rules and regulations is under enquiry in view to modification. The resources of the country are not yet tapped, and the Dewan of Baroda thinks that the salt resources of Dwarka afford opportunity for establishing an alkali factory while the manufactures of textile fabrics and woollen goods indicate large potentialities. The fishery work had to be discontinued, owing to fishermen finding more remunerative occupation elsewhere. The Geological survey is declared to be disappointing as regards metaliferous deposits, but the marble quarries are an asset capable of development. Co-operative Banking needs stimulus and development. The general conclusion is that, Industrial and Commercial operations are still in a very tentative and incomplete condition. An

advance here and another there may not appear satisfactory, but like partially worked material in a carpenter's shop the totality of work done is considerable and sooner or later will take form in the actuality of accomplishment. Industrial and Technical Education is one of the main planks in the platform of the Department of Commerce and Industries and the report contains, in an appendix, a programme of nearly twenty industries regarding which steps are contemplated or are in progress.

THE HOLKAR STATE.

The triennial Report is disappointing, inasmuch as there appears to be a lack of sustained effort. It is depressing, for instance, to read that before Mr. M. V. Kibe assumed charge of the rather poorly constituted Department of Commerce and Industries—the lac industry inquiry was dropped as the propagation of lac proved a failure; that the possibilities of a pencil factory were given up owing to a Mr. Ernest Luber having left the country; that in the absence of proper material available for investigation into Chemical Industries an offer from a Panjab applicant was rejected; that no result was obtained about a proposal to manufacture cement; that a geological investigation of the Parda Iron mines led to no practical result; that an inquiry regarding the production of coal was terminated; that with a paper expert and a chemical engineer combined, no practical result was obtained regarding paper manufacture; that a scheme for a chemical laboratory is still under consideration; that, though a geological survey disclosed the fact of there being iron ore, copper, traces of silver and gold, manganese and other minerals in the State nothing has been done to exploit them; that a report on match manufacture and suggestions thereanent by Professor N. N. Godbole failed to win the approval of the Chief Minister; that wood distillation is still under correspondence; that, though a high percentage of iron ore lies in the vicinity of Barwaha and

an English company formed to work ore was unable to compete with foreign iron, and though, since then, Messrs Shorabji and Company of Bombay undertook to work the ore the matter is still under correspondence and is not mature yet; that several offers to start oil and soap industries are still under inquiry; that the revival of the Maheswar Saree industry, for which two schemes are before the Durbar is still under consideration; that proposals for the development of the tanning and forest Industry (*sic*) was not favoured on financial grounds; that a scheme for the establishment of technical schools has not yet borne fruit; that the proposals long pending, for a leather industry has not "matured enough," and so on, and so on! It is a melancholy list of projects, schemes and might-have-beens which is suggestive of masterly inactivity, red tape and confiding innocence, which is deplorable. The Report, however, has its brighter side, in that there are twelve companies working flour, cotton and other mills, tiles and brick iron and brass foundries, electric supply and industries, printing presses, etc., with a total capital of Rs. 1,22,20,000 at work; that the glass industry shows signs of prosperity; that blanket weaving is more or less a success; that certain railway projects are contemplated; that banking facilities are being opened up; that four hydro-electric power schemes are being investigated but which, however, are not likely to be taken up, pending the inquiry of the Government of India on power schemes, on which Mr. J. Meares is on deputation; and that a paper mill is on the way of being established, with second hand machinery be it said, and pending disposal to private enterprise.

The report gives a long list of other industries to be started and some actually in existence which are the fruit of Mr. Kibe's earnest endeavours to recover the ground lost by his predecessors. The State has had

the advantage of the advice of Professor H. Stanley Jevons, and other, admittedly able, experts in industrial concerns. That the Holkar State is in a position to build up and expand the industrial life of the people of the province goes without saying; and if Mr. Kibe does not weary in his well doing, the next report will probably record much actual work done during the current year. Mr. Kibe must be congratulated on his activities and success, such as they are. The conservative character of the population and their unenterprising spirit are great obstacles to surmount but none the less is evident an absence and push, initiative and sustained endeavour on the part of Mr. Kibe's predecessors which has retarded the industrial development of the resources in the Holkar State. It is necessary to observe that it is admitted that industrial and business incompetence was one of the causes of the numerous failures recorded.

Mention was made recently of the trials of agricultural tractors which were organized by the Indian Government at Nagpur. These trials were carried out under exceptionally difficult conditions, the ground being hard-baked after five rainless months, and it was considered doubtful even whether the tractors would be able to perform their allotted tasks. Five machines competed—the Austin, Cletrac, Fiat, Fordson and Lauson—the last-named being a particularly powerful American machine. The Cletrac machine was withdrawn. In the four hours' test the Austin and the Fiat ran each other rather close, the British tractor having the advantage of paraffin consumption, the quantity consumed being $37\frac{1}{2}$ pints for ploughing $1\frac{3}{4}$ acres to a depth of 7.07 inches. On the final results a good medal and Rs. 500 was awarded to the Fiat tractor, and a silver medal and Rs. 500 to the Lauson, while a special reward and Rs. 1,000 was made to the Austin, which was adjudicated the best in the light tractor class.

MYSORE SECONDARY SCHOOLS.

BY VENKATARAMA AYYAR, M.A., L.T.,

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I submit for consideration the following few suggestions on the Mysore Education Memorandum. They relate to (1) the Introduction of 'Civics as a compulsory subject in the S.S. L. C. Curricula of studies, (2) the systematic medical inspection of School children, and (3) Moral Instruction in Schools and other minor topics.

CIVICS.

Education has now been accepted on all hands as the work of drawing out an individual's latent capacities and enabling him to fulfil his part as a citizen creditably to himself and usefully to others. This aim of Education for citizenship ought to control the curricula of studies in all High Schools. Our present S. S. L. C. Curriculum demands of all students a compulsory knowledge of (1) certain set Texts, Grammar and Composition in English and a Vernacular, (2) the A. B. C. of Arithmetical and Algebraic computation, and (3) the mere rudiments of Physics and Chemistry. This scheme of studies is incomplete because of the absence from it of even an elementary knowledge of Civics. The present writer has sorrowfully observed the colossal ignorance that prevails among many youths that had just completed their secondary school course, not to make an irreverent mention of even older men, on matters like the actual relationship between a Native State and the Imperial Government, the functions of a Resident or Political Agent, the nature and scope of work of a Municipality or a Local Board and such other kindred topics. The introduction of Civics as a subject for public examination, on lines similar to those I have ventured to suggest hereunder, would surely tend to

remove all hazy or wrong notions now current and enable a student, when he grows up, to make an intelligent use of his vote and voice and to realise the duties and rights of citizenship in a civilised state.

The one objection that I have found seriously urged by some with whom I have had a talk over the subject (and whom I have eventually won over to my side) is that of overburdening what they considered an already heavy curriculum. The heaviness or otherwise of a curriculum should not always be judged solely on the single statistics of the percentage of passes at the public examination. I agree that the results thereat have not so far been highly encouraging and do warn us to pause and consider before proceeding further. But I am convinced of the fact that the present courses of studies are neither too light nor too heavy and that a boy of average ability devoting two hours every day to study at home can creditably cope with it. Hence the root of the malady lies elsewhere and not on the bogus of a heavy curriculum. Secondly, something in the direction of teaching Civics was formerly being attempted with the aid of a book known as 'The Citizen of India.' Again, the inclusion of Civics as a subject for Public Examination would even go to meet the flimsy, if not purely fanciful argument that some advance to the effect that the present system of examining all students together in Elementary Mathematics and Science operates to the disadvantage of students of History inasmuch as the Provincial average (they think) is unduly raised by the comparatively better answers of students of Optional Mathematics and Science. Here, then, is a subject where the students of History may try, if possible, to secure compensatory advantage. I would further suggest that the three subjects, Elementary Mathematics, Elementary Science, and Elementary Civics be treated as one whole group of subjects for all examination purposes, the Provincial

and individual averages being struck by taking the three together.

The nature of the syllabus I desire may be gathered from the following rough sketch.

The British Empire—the various units comprising it—the Central Government and Legislature—The King—The three estates of the Realm and their respective powers—The Parliamentary procedure by which a Bill becomes an Act—The Self-Governing Colony and the Dependency—the Indian Dependency and its Government—The Secretary of State and His Council—The Viceroy and His Council—The Provincial Governments.

A Native State—The policy pursued with regard to Native States by Governors-General before the Queen's Proclamation—The Present policy controlling their mutual relationship—The Resident or Political Agent and his functions.

The Mysore State—A short sketch of its history till the Rendition—His Highness and Family—The Dewan—The Executive Council—The Representative Assembly—The mode in which administration is carried on in the various departments of Justice, Land Revenue, Excise, Forests, Mines, Industries, Agriculture, Police, Jails, etc.—Education in the State—Medical aid in the State—Income and Expenditure under the various main heads.

The Area and Population of Mysore—Its geographical features and climatic conditions—Its rivers and mountains—Forest and Mineral Resources—Agriculture and Industries—Railways and other means of traffic—Industrial and Commercial possibilities—The Kolar Gold Fields, the Sivasamudram Power Scheme—The Kannambadi Project.

The Important Cities and Towns—Municipalities and Local Boards and their constitution and functions—Temples, Mutts and other religious or charitable endowments—Places of Scenic, Historic or Archæological Interest, etc.

This syllabus could be covered easily by a one-year's course in the sixth form of 2 hour periods per week, the altered allotment in the time-table being 7 periods for English, 3 periods for Vernacular, 4 periods for Elementary Mathematics, 3 for Elementary Science, 2 for Elementary Civics, 10 for the two Optional subjects and an extra period for Moral Instruction and Training. Thus, the proposed Civics Course will finely round off the general knowledge of History and Geography that students have gained in their IV and V Forms and earlier. A paper of 2 hours' duration on this subject may be set at the Public Examination.

MEDICAL INSPECTION OF SCHOOL CHILDREN.

That the physical well-being of a child is not only of paramount intrinsic importance but is also vitally and intimately connected with its intellectual and moral growth is now a matter of common knowledge. Youths, during their scholastic career, fall a prey to many physical deformities chief among which are Myopia, a Bent Spinal Column, and Contracted chest. In spite of all that a loving teacher can do by way of admonition and advice and that a sympathetic administration can do by way of well-lit rooms and Hygienic seats and desks, students assume very bad postures at study; many more, owing to City life, poor food or general debility have weak vision. Unless these are carefully examined by a competent medical officer who has had a liberal training and steps are taken to nip their growth in the bud, the defects continue to grow day by day till they become irremediable. The present writer had slight myopia in his IV Form; it was, however, not taken proper notice of, inasmuch as it was not glaringly seen on account of the habit of sitting nearest the teacher and the black board; he went on reading voraciously out of books in small print, at last the defect was noticed one day in the Sixth Form, when having gone unprepared with his lessons, he was sent to the

last bench and asked to read out what was on the black board. Thus, due to sheer neglect, his myopia developed to a great extent; similar instances can be cited without number. All parents are not educated enough and even of those that are, many cannot and do not spare time to watch their children at study. Hence the State desirous of improving its citizens has a moral obligation to discharge in this respect. No system of education based on sound principles can therefore afford to dispense with the essential duty of providing regular medical inspection of the children in its schools. I know that the Department of Education and the University in Mysore are keenly alive to the importance of Medical Inspection and are concerting measures for the discharge of this function of theirs. It is my desire only to send in my humble petition to them for the speedy carrying out of their intended plans.

An annual medical Inspection of each pupil's height, weight, chest, lungs, eye sight, hearing and speaking, of which a permanent record might be left with the head-master, with an appended list of cases needing urgent attention or special treatment and the way such treatment should be carried out will surely enable the head-master and the sports committee to make each boy aware of his defect and its remedy and to insist on the regular attendance of such boys at prescribed games. Especially is this medical examination most necessary, during adolescence, as then youths are most impressionable, even physically, every year of postponement of this absolutely essential part of any educational programme on wrong notions of economy or otherwise means so much of physical degeneracy and consequent mental stagnation.

MORAL INSTRUCTION AND TRAINING.

At present, custom seems to be that one period per week shall be devoted to Moral Instruction when teachers either do their other lessons or occasionally preach a sermon as they like. Instead of allowing this

to be done as the whim and caprice of each individual teacher may direct, steps may be taken to provide each school with some collection of about a hundred stories culled from the world's mythology and published by the Department of Education for being taught in all recognised schools.

There is, again, one other aspect of Moral Training and Instruction, which is slowly gaining foothold in several Western countries, and which, I am sure, will have most salutary effects *viz.*, Sex Instruction in Schools. Teachers and Laymen would only be deceiving themselves if they shut their eyes to the prevalence (at least, to a slight extent) of immorality and sexual perversity in schools. This is sufficiently testified to by even the one fact of much obscene scribbling being found on the walls of latrines and other parts of almost every school. Three methods of reform have been attempted till now. They are (1) the conservative method of inculcating moral maxims by precept, (2) the method of self-assertion and co-education of the sexes, tried in various schools in America, and (3) the National method of full and free instruction of the nature and functions of each sex and the sacred duty of healthy parenthood. Wherever the last method has been adopted, there has been an almost unanimous pronouncement of splendid success. It is followed in several schools in Scandinavia, Denmark, France, Germany and America. The innovation, however, will surely meet at present with a storm of opposition from the vast majority of the conservative Indian Public, yet it deserves to be gradually popularised. India may not be fit for the second method of co-education for several decades to come; but a judicious course combining the 1st and 3rd methods could be adopted after a decade at least, if from now, steps are taken to popularise sex-instruction by introducing into School and College and Public Libraries all weighty literature bearing on the subject as the works of W. M. Gallichan, Havelock Ellis, Geddes and Thompson, Trall and others who have displayed great caution, keen insight, and found

Psychology in their masterly volumes. This first step is fraught with no risk and may (I am sure, will), by drawing greater attention to the subject, lead to better results.

LIMITING THE STRENGTH OF CLASSES.

Classes in the Government High School, Bangalore, were, last year, on an average, 60 strong. In other places, I hear, the average was no less. This unwieldy number tends to impair efficient instruction. No attempt at watching individual progress is even thinkable. To promote efficiency of instruction, it is imperatively necessary that the strength of a class shall under no circumstances exceed the liberal maximum of 40 boys. The Circular setting forth this principle should also explicitly state that the limit is perfectly inelastic. If more schools are needed because of strict adherence to these rules they ought to be started, at any cost, by State or National enterprise.

TEACHERS' RETIRING ROOMS.

Education in Bipolar and both the teacher and the taught should ever be learners. Facilities should be given for putting this principle into practice. Every High School should, therefore, have as its ideal of equipment that of providing its teachers with separate retiring rooms. The present system of crowding not less than 20 teachers into one room, meagre in size and furniture, cannot but lead to idle chat. As a first measure, I would request that a room of the dimensions of the class rooms in the Government High School, Bangalore, be set apart for four teachers and not more and that sufficient screens and furniture be provided in each room so that they may be apart though within the same four walls.

CONCLUSION.

Many other defects in our present educational work will surely disappear when, after the introduction of Polytechnic schools and with the lapse of time, more books in the Vernacular, with an ample vocabulary of all scientific and technical names known to the modern world, appear in our land and, when the gulf between the so-called 'Literate' and 'Illiterate' is bridged over by making the mother-tongue the medium of all instruction and intercourse and when the word 'Illiterate' itself will find no place in our Census Returns by the free and compulsory instruction through the vernacular in the three R's of every citizen of the State.

ECONOMICS IN THE WEST.

Industrial Situation.

London, 15th April, 1920.—Our industrial situation is still a somewhat uncertain one. Labour is restless and we hear once more of demands for increases of wages, notably from the railwaymen and the miners. In this case "the appetite grows on what it feeds on." Additional payments secured with comparative ease lead to a desire to obtain yet more and so we go round the vicious circle. The present position of many sections of the working classes is really extraordinary if we compare it with their standing on the prewar period. The Dockers, for example, have just been granted by official award a standing wage of sixteen shillings a day. Many of us are old enough to remember the violent agitation which Mr. John Burns headed to secure "the docker's tanner" on sixpence an hour. In effect the dock workers are given a rate of pay which is three and a half times in excess of what they received a few years ago. Nor is this the whole of the story. The men under existing conditions work shorter hours and they do less for their money than they did. If we could be sure that the new standardised pay would stimulate the men to greater energy we might regard it with a certain equanimity though it puts a heavy handicap upon our shipping trade; but notoriously high pay goes with relaxed effort and we cannot look for any material improvement in the working system in the future, or at all events the near future. Probably for that we shall have to wait until the after war fever for a good time has subsided and the effects of foreign competition have begun to be felt. Disquieting, however, as the position of affairs is it might be a good deal worse. We have no monopoly of Labour troubles with their accompaniments of exaggerated demands for wages. Our greatest

trade competitor the United States is on the throes of an acute crisis, and across the channel in France and Italy the nearest is still more marked. At the same time our trade is so good that it can bear quite extraordinary burdens. Indeed, there was never a time in modern history when the foreign demand for British goods was so steady and persistent in spite of the enormous increase in price that has taken place in almost every department of manufacturing trade.

INDIAN INDIGO INDUSTRY.

Professor Henry Armstrong has sent to the *Times* a long and interesting letter which contains matter of much encouragement to those who have hoped that the revival of the Indian indigo industry consequent upon the failure of the supply of artificial indigo owing to the war, would not be a mere passing phenomenon. The facts given in the communication are familiar to people in India who have kept in touch with modern developments in regard to the industry and more especially with the valuable work done by the Pusa Institute. But it may be of service to refer to some of the Professor's points which certainly illustrate in a remarkable way, the value of research in industry. Professor Armstrong after alluding to the changed spirit of the planters which has led to united action through the medium of the Indigo Planters Co-operative Association gives some figures which show how enormous is the field open to the operations of the indigo cultivators. Thus, he states that in 1913 Germany and Switzerland exported to China no less than 27,000 tons of 20 per cent indigotin-paste, the equivalent of 9,000 tons of 60 per cent indigotin indigo. Last year India produced only 600 tons of this grade, and even when the industry was at its highest the amount was only on an average about 7,000 tons per annum. In the Eastern market alone, therefore, the Indian indigo industry has a sphere of great potential value to operate in. Happily, as Professor

Armstrong shows, the authorities in India working in conjunction with the planters are showing a spirit of enterprise which encourages the hope that the industry may at no distant future be restored at least to the position it formerly occupied. The researches made by the Pusa authorities have led to a more intensive and scientific system of culture and under the skilled direction of the Institute we may look for a remarkable improvement both in the yield per acre and in the quality of the resultant indigo. In reference to the superior attributes of the natural indigo Professor Armstrong furnishes some interesting details of trials made with natural indigo in treating piecegoods. The trials, he states, were conducted by Messrs. George Garrett & Sons, a firm of great experience as indigo dyers. "Vats were set and worked with equal proportions of natural and artificial paste: two pieces were dyed at a time, equal weights of cloth being taken for each vat. The number of comparisons thus made was 37, using 74 pieces of cloth. In each comparative trial the depth of shade produced was greater in the vat charged with natural paste. Mr. Reginald Brown estimates the superiority of depth in the series of dyeings at from 5 to 20 per cent. The difference is patent even to my uninstructed eye. A serge properly dyed with indigo should always rank superior to one dyed with indigotin only—hence we may hope that ere long indigo will again be available in our home market." In conclusion Professor Armstrong emphasises the distinction that there is between Indigo and indigotin. It is not permissible, he says, to speak of synthetic indigo, nor is it necessary to speak of indigo as natural indigo. "Whilst nature, assisted by man gives us indigo, art gives us but one of its constituents, indigotin. It is as in the case of fermented beverages; no art can give us a vintage wine—one of the most perfect of nature's products, to those who can appreciate perfection—but it is easy to make alcohol, even to produce it

from coal with the aid of a waterfall." The whole letter serves to illustrate how valuable a possession India has in its indigo industry. It also points the moral that scientific research is imperatively necessary in this and hundred industries if full success is to be obtained. The communication will be an encouragement to those who in recent years have advocated and supported the policy of increasing the facilities for research in India.

CAMPBOR CULTIVATION.

Camphor is a commodity which ought to attract more attention than it does from topical agriculturists within the Empire. So says Professor P. Carmody in an article which appears in the *Times Trade Supplement* and no one who studies the facts will be disposed to disagree with him. The world's annual consumption of camphor is 10,000,000 lbs. and the demand is an increasing one despite the fact that the current price of the commodity is 23s. 6d. per pound. At the present time the Japanese have almost a monopoly of the market for camphor, but there is no substantial reason why it should not be produced profitably in most of the tropical regions of the Empire. An experimental planting of the camphor tree was made in Ceylon first in 1852, and more extensively in 1893 when seedlings were obtained from Japan, but the venture never proved a commercial success. More recently experiments have been made in British Malaya and the results though not final have demonstrated the possibility of cultivating camphor with a fair prospect of making a substantial profit. There must be many regions in India where Camphor trees could be grown under favourable conditions and if the culture is taken up it may be well for experimenters to bear in mind some of the precautions which must be taken if success is to be achieved. Professor Carmody states that seeds or seedlings from trees that yield no solid camphor must not be used under any circumstances, stiff clay soils must be avoided, not more than 300 trees to an acre

must be grown in good average soil or not less than 12 feet apart in hedge rows, and a sufficient area (from 100 to 500 acres if possible) for economical distillation. When the trees are four or five years old they can be dipped and thereafter the operation may be performed three or four times a year. The cultivation of the tree seems quite simple but doubtless there are considerable variations of production and quality due to local conditions. Moreover, the present high range of prices, or anything like it, for camphor cannot be relied on, and any intending cultivator will have to bear in mind the possibility of the market quotation for the commodity dropping to a few shillings a pound.

MANUFACTURE OF NITROGEN.

During the war we heard a great deal about the manufacture of nitrogen from the air by ourselves as well as the Germans. What was then done for munition purposes for the manufacture of explosives—it was hoped when peace came might be accomplished for industrial purposes. This expectation, it is satisfactory to state, is on the point of being realised inasmuch as arrangements are nearing completion by which the synthetic ammonia factory set up during the war under the auspices of the Faraday Society will be transformed into a commercial project on a very large scale, while many other fixation schemes are under consideration throughout the Empire. So are our weapons of war turned to ploughshares and our warrior scientists into men of business. What a pity it is that we cannot turn many other of our war departments to as good commercial use! We might then regard philosophically the liquidation of the enormous debt which they have helped to create. Not, however, that Commerce is not playing a big part in carrying on with war machinery. Only in the past few days, for instance, the arrangements have been completed for the sale to a big syndicate of the vast motor

reparing depot at Slough over which there has been so much controversy. The price to be paid to the Government for the property, it is said, is to be six millions.

PROFIT SHARING.

Profit sharing is believed by many to be a panacea for the ills from which the Labour world is at present suffering. There is, however, not much in the latest Parliamentary paper on the subject—a recently issued report on “Profit sharing and Labour Co-partnership in the United Kingdom”—to encourage the faith that many people have in the efficacy of the principle. In all there were in existence on Oct 31, 1919, 182 schemes involving about a quarter of a million of work people. The number of schemes is not large having regard to the size of our industrial system. Nor is it possible to obtain consolation from the thought that the profit sharing idea is too young to have attained to full proportions. The first scheme of the kind of which the report takes cognisance was started as far back as 1829 and there are a number which go back forty or fifty years. What is most distressing is that since the official records were first compiled nearly 200 schemes have failed. Only 36 of the existing schemes, or one in five of the total, date back before 1901, and 95 date from 1911 or some later year. Various reasons are assigned for the failure of projects, the commonest being dissatisfaction of the employers or the employed with the results. In spite of the discouraging experience of the past the principle of profit sharing or more accurately, co-partnership is gaining in influence. Some of the largest banks are adopting the system by allotting special shares to their employes, and I hear of it in other directions. A significant indication of the drift of opinion on the subject is furnished in a letter contributed to the *Times* by Sir Charles Macara, the well known Manchester industrialist. In this communication in referring to the agitation

amongst the cotton operatives for increased wages—an agitation which may add from £50,000,000, to £70,000,000 a year to the charges on the industry—Sir Charles suggests that the best means of meeting the situation would be by giving the operatives their next advance in the form of monetary interest in the industry. “The proposal,” he says, “opens the way for the workers to reach a position they have never before occupied in the industry; it enables them to conserve their increased wages, to obtain a share in the control of the industry, and to bring nearer ‘nationalisation’ in its best form.” It remains to be seen how the operatives regard this proposal. Hitherto Trade Unions have found in profit sharing and co-partnership in the belief that such schemes weakened the workers spirit of independence, but the Lancashire cotton operatives are of high intelligence and are not likely to be swayed by narrow sectional motives if they think that the advantages they derive from the system will be of a substantial character. If they should agree to the proposal and the system was adopted throughout the industry an epoch making change would have been introduced in the relations of employers and employed, for this is peculiarly a case in which what Manchester and Lancashire said one day would be said by the whole country the next.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

The Floating Freight Trains of the Mississippi.

Washington, D.C., U.S.A., Apl. 21, 1920.—

On a certain morning a few weeks ago the greatest inland waterway in the world, after drowsing along for years through all the din that a busy group of river enthusiasts could make, awoke to a sudden realization of modern conditions. The occasion for the quickening pulse that throbbed down the Mississippi River that day was relatively small—merely the arrival at the St. Louis (Missouri) docks of two new steel barges. Big as they were, modern to the last engineering detail, and extremely interesting in themselves, their real significance lay in the fact that they were the advance guard of a fleet of 40 similar barges, and of six new and powerful towboats, which are the locomotives of these latest of floating freight trains.

This \$7,000,000 project is the government's convincing answer to the persistent prayers that have gone up for many years out of the Mississippi valley. It is the first official investment in floating stock in any way commensurate with the enormous sums that have been spent for improving the great track on which these mammoth trains will run—the big rivers of the Mississippi basin.

The new water tractors are of the twin-screw type, driven by engines of 20,000 to 25,000 horsepower. The propellers operate in steel tunnels under the stern, and by an ingenious arrangement the screw, although it is seated so high that its upper blades are above water level, is always submerged. The siphon action of a higher part of the tunnel, over the propeller, accounts for this paradox.

If the term “floating freight trains” brings up the familiar image of a railroad box car

or gondola, perhaps perched on a raft, the idea may be promptly dismissed. Each of these new all-steel barges holds 2,000 tons of freight—the equivalent of 20 to 100 cars. Each is 250 feet long, 45 feet in the beam, with a hold 10 feet deep surmounted by a 9-foot cargo box, giving a loading space 19 feet deep, 184 feet long, and 37 feet wide. Transverse and wing bulkheads, the latter oil-tight, divide the hold into 18 compartments, and there are 16 hatches 14 by 16 feet, and 16 double sliding doors, eight to a side. The scow-shaped hulls are designed to offer the least possible resistance to the water on the upstream tow, and their draft is comparatively small. Five of these barges and one towboat constitute a "train," with a total capacity of 12,000 tons of freight. The schedule time for such a train from St. Louis to New Orleans is four and one-half days, which is actually less than rail freight schedules.

While all these preparations for an immense organized transportation system on the lower river are in the making, the upper reaches of the great river are not being neglected. Up in the St. Croix River a steel barge even larger than those of the down-river fleet has been launched the nucleus of another flotilla of 24 freighters and four towboats, for trade between Minneapolis, Minnesota, and St. Louis, Missouri. These up-river barges are 300 feet long and 48 feet wide, carrying 2,600 tons. They cost \$170,000 each.

FOREIGN AND AMERICAN COTTON CONSUMED IN THE UNITED STATES.

The United States Department of Commerce has just issued interesting statistics of the cotton consumed in this country. This applies both to American-grown cotton and the foreign product.

The figures show the cotton consumed in the United States in the month of March, 1920, to have been 575,704 bales, compared with 433,485 bales in March of 1919.

4,235,499 bales were used in the eight months ended on March 31st, 1920, as against 3,817,469 in the corresponding period ended March 31st of 1919. These statistics are given in "running bales," counting round as half bales, except the foreign cotton, which is in equivalent 500-pound bales.

There were on hand on March 31st, 1920, 1,900,000 bales in consuming establishments and 3,300,000 bales in storage warehouses and at compresses, as compared with 1,470,000 bales and 4,327,000 bales, respectively, on March 31st, 1919. The 1920 figures include 40,800 bales foreign and 5,500 sea island bales consumed, 95,000 foreign and 23,000 sea island in consuming establishments, and 72,000 foreign and 18,000 sea island in storage.

Imports of foreign cotton during the month of March, 1920, totalled 134,000 bales (500 pounds each), while in the March of 1919 the amount imported was but 15,561 bales. During the eight-month period ended on March 31st, 1920, the United States imported 567,000 bales of foreign cotton, against 91,600 in the same period ended on March, 31st, 1919.

Exports of domestic cotton and linters amounted to 795,000 bales in March of this year, as against 504,000 in March, of last year. The exports for the eight months ended March 31st, 1920, were 5,300,000 bales, and for the corresponding period of 1919 were 3,500,000 bales.

AMERICA EXPORTS TYPEWRITERS TO 97 COUNTRIES.

Typewriting machines were exported by the United States to ninety-seven countries in the calendar year 1919. These were valued at \$18,391,000. England was the largest buyer, taking \$3,071,368 worth. The next five countries in order of amounts taken are as follows: France, \$2,686,177; Canada, \$1,032,191; Italy, \$846,799; Brazil, \$611,260; British India, \$573,690.

MACHINE TOOLS MADE OF CONCRETE.

Much interest has been created all over the United States and in other countries in a newly-invented planer of record-breaking size, and a machine for boring holes of any size or length. The planer is designed especially for producing the boring machines, and is a radical departure from anything hitherto attempted in the machine tool line, while the possibilities suggested by its construction are numerous in a great number of fields. The planer is built of concrete and iron, and is the first machine of its kind that has ever been built of that combination. It is also the biggest planing machine in the world.

These machines are so unusual in construction, and can be built with such speed, that the methods of manufacture are attracting wide attention. An attempt to build the big planer of iron, according to regulation methods, would have meant a delay of at least two years. By the new method they can be turned out ready for use in two months.

The original construction plans for the planers provided for a battery of four machines, each with a bed 184 feet long and 17 feet wide. Four of the machines are now completed and in use, and two others are in process of construction. Each planer weighs about 2,500,000 pounds, and contains approximately 212,000 pounds of iron and steel casings and 14,000 cubic feet of concrete reinforced with 34,000 pounds of steel bars. The bed of the planer is designed like a huge concrete girder intended to support a load, which accounts for the high percentage of steel reinforcement. This was done to avoid any possibility that the bed might settle at any point and destroy the alignment of the ways.

On the bed of the planer there is a sliding platen, which moves in iron grooves. The platen weighs 69 tons, and upon it is placed the work that is to be planed, two heavy

travelling cranes being used for the latter purpose.

The power for running each planer is furnished by two 40-horse power, three-phase, 60-cycle motors running at 1,800 revolutions per minute. One motor drives the table forward at a speed of approximately 20 feet a minute while the other gives a rapid return of approximately 40 feet a minute.

The method of feeding the cutting tools might be termed "human feed," and is perhaps as unusual as the planers themselves. No automatic means of feeding is supplied, each cutter head being controlled independently in both horizontal and vertical direction by a man stationed on the top of the housings. Four 24-inch hand-wheels are conveniently located for the operator at this place, and the shaft carrying each hand-wheel also carries an index finger which, in conjunction with a graduated dial, forms the means of gauging the rate of speed.

The boring machines being made on the planers can handle a piece of metal 38 feet long.

A FOLDING CAMP STOVE.

A camp stove to be success must be light, compact and easy to set up. It must also have some appliance for sheltering the flame from the wind. A stove just awarded a patent here has all of these qualities, and is unique in many other respects. It weighs 27 pounds, measures 10 by 15 by 24 inches and can be set up or taken down in three minutes.

The cover and two side pieces of this stove made a wind-proof shield, and the hinged lid, which is uppermost when the stove is carried, drops forward when the stove is placed in position for cooking, and forms a shelf.

To make this stove, purchase a small two-burner gasoline stove on sale everywhere, and wreck it, as these burners can hardly ever be bought separately. Use the top, burners, piping, and tank for the new stove,

and make the rest out of light sheet iron. Rivets may be used throughout in putting it together, no soldering being necessary. The stove can thus be folded compactly for travelling, and is readily unfolded for use in a few moments.

NEW PRESS PRINTS, ADDRESSES AND SIGNS LETTERS.

Believing that "filled in" circular letters receive but scant, if any, attention from the average busy business man, a manufacturer, after long experimentation, is now producing on automatic press most ingeniously constructed which not only prints the colored letter-head and signature, but (which is far more important) actually "typewrites" the name and address in a color and position which perfectly match up with the body of the letter.

When in operation, paper from a roll 8½ inches wide is fed into the press with great rapidity, 11 inches at a time. The body of the letter is first imprinted by means of a type bed, inked ribbon and moving roller. This part of the operation is somewhat on the order of the well known "Multigraph," so universally used. The name and address on a small zinc plate, having fallen into place meanwhile, the ribbon and roller then print the "fill in" in exactly the right place and colour. The paper strip passes next into a cylinder press, where it takes impressions from two electrotypes plates, one for the letter-head and one for the signature. A knife then cuts the paper to size, and the letter is ready for mailing.

The machine is said to be useable for many purposes where any kind of printing is required, and is being put into operation in many places as an ordinary printing press, as an envelope and wrapper addressing machine, or for ruling and cross-ruling order blanks and forms of many kinds.

AN ELECTROLYTIC RECTIFIER FOR CHARGING STORAGE BATTERIES.

The automobilist, amateur or professional, will find the rectifier to be described both

cheap to construct and quite efficient. It is of the single-cell type, but by using three electrodes and a special lamp bank it uses both sides of the cycle. This construction is much cheaper than the use of an auto transformer and almost as efficient.

The lamp bank and switches are mounted on a board one foot wide and two feet long. Eight lamp sockets are mounted in two rows, with two double pole switches at the bottom. These should be 10-ampere indicating snap switches. The terminals for connecting to the storage cell to be charged are located at the lower edge of the board. The board is then mounted on the wall convenient to a source of alternating current, a shelf to hold the rectifier cell being placed above it.

For the cell container any large glass or porcelain jar will serve. The jar from a 300-ampere Edison primary battery is ideal. If one of these is not available any jar 7 inches in diameter and 12 inches high may be used. Make a cover of wood, and impregnate it with paraffin. Three holes are drilled in the cover to support the plates.

The plates measure 3 inches wide and 11 inches long and $\frac{1}{16}$ of an inch thick, two being of aluminum and the other iron. Holes are drilled in the ends of the plates before ending, and then they can be mounted in the cover by bolts that form terminals. Connections are to be made to these terminals by flexible leads.

This outfit is said to be quite practical and serviceable. The maximum direct current obtained is four amperes.

PLATING BY COMPRESSED AIR.

A new method of plating metals, in which compressed air is employed, is meeting much success in the United States. The surface to be placed is cleaned with chemicals and then a thin sheet of the plating metal is blown on with a device resembling a hand torch. The torch contains a small electric furnace which reduces the plating metal to a liquid, and through the connection with a

tank of compressed air the molten metal is sprayed into the surface.

By this method, brass, gun metal and copper are put on iron or steel for such parts of machines as require it, the coated metal parts being used instead of the solid metal.

This particular compressed air and electric furnace plating scheme is portable and declared to be most convenient in usage. It will doubtless have a wide use in the coating of tanks and other large structures where the plates cannot be plated before erection.

The well-known "Schoop" process is said to be about eight years old, and is capable of depositing lead, tin, zinc, aluminum, copper, nickel and their alloys on any coherent object, metallic or other. The difference between the Schoop method and that here described is that the former involved the use of a "pistol," air at 40 pounds pressure, a tank of hydrogen and another tank containing some reducing gas, usually oxygen, the metal to be applied being liquified in flame; whereas, in the latter a small electric furnace is utilized to make the metal molten before it is projected by the air pressure.

The Schoop process has been used in the United States to some extent, but is still susceptible of considerable development. Here its use is said to have been wholly for its convenience in ordinary practice and not as economical expedient.

ALFRED T. MARKS.

NOTES.

We in Mysore are talking of sugar production, while others are doing. In a review of the Sugar Crop of the West Indies the Canadian Trade Commissioner states that the quantity of sugar and molasses exported last year fell below the estimate by nearly 24,000 tons. Slight increases over their estimates were made in Jamaica, Barbados, St. Kitts and St. Vincent, but a shortage of 30,000 tons occurring in Trinidad and British Guiana, left the net total shortage as stated above. In British Guiana the shortage was accounted for by the scarcity of labour in the colony, but in Trinidad there was no apparent good reason why there should have been a shortage. In the statement of the export of sugar given in the following table, cane syrup, stated in terms of sugar, is included, three puncheons of syrup, being taken as equal to one ton of sugar. The total export of these together amounted to 267,247 tons. The quantity of sugar exported, without including syrup, was 239,883 tons, a good pre-war average, and the quantity of syrup and molasses was 93,027 puncheons, of which Barbados exported 81,111 puncheons. The following table gives the quantity of sugar exported last year, and an estimate of the crop for the present year, which includes syrup equated to sugar:—

	Exports, 1919. Tons.	Estimate, 1920. Tons.
Barbados	... 75,271	50,000
St. Kitts ...	... 10,901	15,000
Antigua ...	... 12,841	16,667
St. Vincent	... 570	1,136
Trinidad ...	... 37,805	40,000
Jamaica ...	... 43,000	48,000
British Guiana	... 83,140	96,000
St. Lucia	... 3,661	4,400
Montserrat	... 58	115
Total ...	267,247	271,318

Electrification of railways has been urged by many. According to the Swedish press the Administration of the State Railways has presented to the Swedish Government a detailed statement with an estimate and plan for the continued electrification of the State Railways, and a more detailed proposal for the electrification of the Stockholm-Gothenburg line. (See page 183 of the "Journal" of 8th August.) The Administration request the Government to apply to the Riksdag for their sanction to commence the electrification of the Stockholm-Gothenburg line at a cost of seventy-five million kronor, for which amount they suggest a temporary Government loan should be granted. As regards the general electrification of the Swedish State Railways, the Administration consider that, in view of the abnormal prices of fuel, this is very desirable and advisable. As such an undertaking would, however, entail a considerable outlay of capital, the electrification would have to be carried out successively in restricted areas and in fixed periods. In investigating whether the necessary electric energy can be supplied for the general electrification of the Swedish State Railways, the "train kilometres" and "gross ton kilometres" for 1913 have been doubled. It is calculated that eight power stations, each with a separate district, could be counted on to supply the power. These stations would be at Porjus, in the Ume, Indal, Dal (two stations), and Motals Rivers, at Trolhattan on the Laga River. The consumption of electricity by the State Railways from these eight stations is calculated at 412,851,000 kilowatt hours, and by the private railway at 294,852 kilowatt hours. After the completion of the Stockholm-Gothenburg line, the Jerna-Norrköping, the Katrineholm-Malmö Trelleborg, and then the Stockholm-Bracke lines should be electrified.

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The demand for cement in India is growing at such a rate, and the prospects and conditions of cement manufacturing in India are

considered to be so distinctly good, that several new cement projects are being actively investigated. The Katni Cement and Industries Co., Ltd., of which Mr. P. C. Dutt, the barrister and industrialist, was the originator, has now become the largest producer of postland cement in India. Messrs. Tata and Sons, and Messrs. Killick Nixon's Bundi factories have also been important producers, and under the guidance and control of Sir Thomas Holland, the efficiency of these three factories were greatly increased during the war. And now under the auspices of the Associated Portland Cement Ltd., a powerful British combine, limestone deposits in Bihar and Burma have been investigated and works are about to be erected near Dehri-on-Sone. It is further reported that an entirely new project for manufacturing portland cement on the largest scale at Bezwada has been matured by Mr. A. Ghose, the well-known mining specialist. Messrs. Burn & Company have recently floated a company with a capital of one crore of rupees for manufacturing cement near Jukahi in the Central Provinces. Another large cement project is, it is reported, being investigated by Messrs. Tata & Sons in Hyderabad, Deccan, and extensive limestone concessions have been granted by H. E. H. Nizam's Government, Mr. Mitchell, a cement expert, has been examining cement projects in Gwalior and Kathiawar on behalf of Mr. Narottem Morarji Gokaldas of Bombay. Further more, the Government of the Punjab contemplate establishing a large cement factory to meet the requirements of that province.

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During an address by Sir Lomer Gouin, Prime Minister of the Province of Quebec, to the members of the Canadian Pulp and Paper Association at the annual banquet held in Montreal, emphasis was laid on the necessity of conserving and restocking the provincial timber lands. The Premier said that there were 45,000,000 acres of land

under licence, with a reserve of 75,000,000 acres of virgin forest. He claimed that the Province of Quebec had more than one-half of the entire pulpwood supply of Canada and the largest unit of forest wealth in the world. He further stated that there had now been cut about 1,000,000,000 feet of timber, and he was informed that with proper management there might be cut four or five times more than that without endangering the future supply; that is, he explained, from the land under licence and not including the 75,000,000 acres which belong to the Crown. He added that the Government's purpose was to make an inventory of these Crown lands, for which purpose they would establish posts at Hamilton Inlet, Ungava Bay, and James Bay, from which points investigations would be made and aeroplanes would be used if necessary, these stations being connected wireless. He emphasised especially the importance of keeping the raw material for the use of the Canadian pulp and paper plants, and indicated that this policy would not be relaxed, suggesting that the Provincial Government might act further and that the time might come when they would have to limit the cut of the Quebec forests for the exclusive use of Quebec mills.

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The German Press has paid considerable attention of late to the formation of an association, which was formed in 1919, and has as its purpose the representation and development of the German industries, and the determination of uniform policy of each separate trade, and common action in dealing with labour questions. The association consists of a Council and Directorate, the latter consisting of at least 30 and not more than 60 members, who either occupy or have occupied a leading position in an industrial undertaking, or have held a position on a Board of Directorate. The Council is empowered to nominate a further 10 members to the Directorate. The Council itself is composed of 7 to 15 mem-

bers, and is elected from the members of the Directorate. A Main Committee is also nominated, states the *Deutsche Bergwerks Zeitung*, and consists of representatives of each of the 25 industrial branches into which the Association is graded. The total number of representatives is 140. The Main Committee nominate special Committees and elects from year to year a Committee of Investigation. The following special Committees have been formed:—

- (1) Committee for the carrying out of the Articles of the Treaty of Peace.
- (2) Tax Committee.
- (3) Economic Committee.
- (4) Social-political Committee.
- (5) Press Committee.
- (6) Committee of investigation.

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A conference of South Africa Co-operators was held in Pretoria early this year, at which resolutions were passed expressing the opinion that in order to safeguard and extend co-operation amongst farmers it is necessary to have one over-ruling central organization. The Conference appointed a sub-committee to inquire into the necessity for legislation, and to keep specially in mind the necessity or otherwise for such legislation to provide for the imposition of penalties on disloyal members. The Durban Chamber of Commerce in its Annual Report for 1919 makes no comment upon the practice of individuals forming themselves into private societies to provide their own capital and pay their own officers for the marketing of the goods they sell and the purchase of the goods they buy. On the other hand it places on record that it must consistently oppose the loan of public officers to such societies, whose purpose is to increase the private wealth of their individual members. From the published report of the proceedings of the Conference, it states, there appears to be a danger of the formation of a Trust for the whole Union, which may attempt to control the prices of agricultural products, and to punish those of its

members who sell their produce privately or in the open market. The Chamber adds: "The term 'co-operative' has hitherto been associated with bodies of consumers seeking to reduce the cost to themselves of foodstuffs and other necessities of life. It is now being adopted by other bodies with other objects."

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A Government of India Department of Commerce, Press Communique dated Simla, the 14th May 1920, says:—With reference to the recent announcement in the press on the subject of the prohibition by the French Government of the importation of luxuries into France, the Government of India cabled to the Secretary of State for full particulars. The Secretary of State has replied that the full text of the French import prohibition list appeared in the *Board of Trade Journal* dated the 6th May, and that the following are the items in which India appears to be seriously interested:—Cut Precious stones; Fine pearls; Woollen carpets made with knotted or twisted pile, including imitations; Carpets of wool mixed with other materials; Fabrics of goat hair; Many kinds of silk fabrics; Trimminga, ribbons and braids of pure jute. In addition to these, the following are referred to as requiring licenses under decrees already in force:—Tobacco; mineral oils for illuminating purposes; heavy oils and residues of mineral oils. The import prohibitions apply also to Algeria, but are subject to the execution of special international agreements. They do not apply to goods imported for re-export either under the ordinary temporary importation regime or under the special regime set up by the decree issued on the 16th April, 1919.

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The Government of India has decided to re-organize entirely the existing wireless telegraph system, and also to extend it considerably, with a view to improving its efficiency in every possible way. An Indian Wireless Telegraphy Board has been formed,

and the new Civil Wireless Department will be placed under the Director-General of Posts and Telegraphs, and it is hoped that the new arrangements will not only improve the means of communication with ocean-going vessels but will also be of great service in the development of commercial aviation. A special advisory board is to be set up with the following functions, viz:—(1) To co-ordinate the commercial, strategic, and naval requirements of the Indian Empire in connection with wireless telegraphy. (2) To advise on any questions that may be referred to them by the Director-General of Posts and Telegraphs. (3) To make any such recommendations as they may consider necessary on questions of general policy where the interests of more than one department are concerned. It is hoped that further particulars as to the special functions and powers of this board will be forthcoming shortly, and that the example thus set will be followed in both South Africa and Australia.

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The need for an extension of tobacco cultivation in the Empire is similar in some respects to the need for further cotton production, says the *Times Trade Supplement*. For a very large proportion of our requirements of raw cotton we are dependent on the United States. An even larger proportion of our imports of tobacco is obtained from that country. Such dependence on our principal creditor is a great handicap to the nation in its present task of restoring the balance of trade between the United States and the British Empire. Tobacco cultivation cannot be largely extended at a moment's notice, but now is the time for serious effort to increase the production of tobacco within the Empire. To achieve success in tobacco-growing and curing requires rather more than average care and intelligence, but the reward of success is proportionately high, and the rebate of duty on imports into the United Kingdom of tobacco produced in

British territories is an additional inducement.

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It is estimated officially that the sugar production of Queensland for 1919 was about 155,000 tons. During the last six months of 1919 the weather was exceptionally dry, and the outlook for the current year was bad, the ratoon, or re-growth, crops making no progress, and the plant cane, though started, standing still. Summer showers and storms were of local value in places, but the monsoonal, or wet, season set in in good time, and now excellent rains are reported. In 1917 an area less than that at present under crop for the 1920 crushing produced over 300,000 tons of sugar, or with New South Wales and Victoria, 30,000 tons above the official estimate of Australian consumption. Whether the official estimate of 280,000 tons as the Australian consumption is correct seems now open to review, in the face of the great increase in the production of jams, biscuits, confectionary, preserved milk, and other foodstuffs consuming sugar.

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Since the outbreak of the war over 20,000 companies have been formed in Japan, with an aggregate capital of about 4,000,000,000 yen. Many of these companies are far from being sound, and their promoters have contrived to unload their shares on ignorant country people and get out themselves with a profit. It is now reported that the authorities intend to stop this practice by means of legislation founded on an old German precedent at a time of reckless company promoting. According to this report, it will be provided by an Imperial Ordinance that any promoter or supporter of a new company who sells his shares in that company may be compelled to re-purchase such shares at the price received by him within a specified period of time—probably one year from the date of sale.

In a recent publication of the French Ministry of Commerce attention is called to the value of the fibres of the agave or aloe as a material for the manufacture of rope. It is estimated that the production of aloe fibre in 1912 amounted to 152,000 tons, of which 128,000 tons were contributed by Mexico, and 16,000 by German East Africa. Successful experiments in the cultivation of the plant have been made in such French colonies as Guadeloupe, Martinique, Guiana, and the Sudan. It is claimed that aloe rope is very light, that it has great powers of resistance, and that it only stretched 2 per cent in water. It is considered that the climates of Tunisia and Indo-China are favourable to the cultivation of the plant.

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The Madras Government have passed orders making it clear that a sum not exceeding Rs. 25 may be granted as a free gift at the discretion of the District Magistrate, to adolescents released whether finally or conditionally from the Tanjore Borstal Institution. The grant is to be used, as a rule, to set the boy up in life, e.g., by providing him with tools for his trade. The Government point out that it will rarely be advisable to hand over the amount to the released person in the form of money. Where an Honorary Probation Officer has consented to look after the welfare of the boy, the Government suggest that the utilisation of the amount may be entrusted to him.

GLEANINGS.

The Conservator of Forests of the United Provinces, India, has recently asked the Department of Overseas Trade to be placed in communication with British firms manufacturing agricultural steam engines for cable ploughing and cultivation, together with the necessary implements. It is intended to break up considerable areas of heavy grass land in the United Provinces preparatory to afforestation. At present, it appears, only one set of tackle is required, but if the experiment prove successful the work will be greatly extended and more plant purchased. Manufacturers who are interested are asked to avail themselves of this opportunity. The fact that it should be necessary to apply to the authorities here for the names of firms suggests the inadequate system of advertising British goods, especially machinery, in the East. Obviously, if an official cannot find the manufacturers he requires, how can private buyers be expected to do so? It is admitted that American and Japanese manufacturers, whose recent efforts to gain the markets in the East are well known, owe their success to a great extent to their system of publicity and to the mediums they use in advertising, which enable all buyers in the East to find them.

A special type of electric welding machine has recently been placed on the market, designed for the purpose of welding seams in cylinders from, say, $2\frac{1}{2}$ to 4 inches in diameter and from 4 to 8 inches in length. Either sheet iron or steel, or lead-coated metal can be dealt with, and a completely gas and water-tight joint made at a single operation. It is not, however, sufficient for a number of purposes that such a joint should be mechanically sound, and the machine has consequently been designed with a view to making an absolutely smooth

joint which can be plated or enamelled without any further finishing being necessary. As a matter of fact, this machine can be used for finishing of articles that have been drawn or spun to shape before the welding operation is carried out. It is consequently likely to prove of great service in the hardware trade for finishing off hollowware of various kinds. The machine can be driven by a half-horse power motor, and it only occupies a floor space of 16 by 70 inches. It is 50 inches in over-all height, and whilst the maximum diameter of the die that can be used is 5 inches, the upper die has a travel of from 5 to 9 inches.

The trade with India in agricultural machinery is reported to be developing greatly. Ploughs for bullock haulage are in big demand, as are mowing machines of a light pattern, but the most improved line is said to be that for small-size portable threshers. It is said that a substantial trade has been done in this direction, because it has been found that the small machines are far more easily transported than the heavier and bulkier types—an important point to consider when the state of the Indian roads and bridges is borne in mind. Machines for India have to be made of special wood to withstand the onslaughts of insects, and it is asserted that certain developments which have taken place in this respect quite recently have made British threshing machines very much in favour with Eastern users.

According to an official statement recently published by the *Office des Renseignements Agricoles*, the rearing of the silkworm in the nineteen Departments where this industry was carried on occupied no fewer than 52,401 persons. The quantity of "grain" (silkworms' eggs) incubated was 65,983 lots of 25 grams (nearly an ounce) each, of which 63,277 lots were of French, and 2,676 lots of foreign origin. The total production amounted to 2,671,623 kilogs of cocoons

(*cocons frais*), that is to say live ones. This gives an average of about $40\frac{1}{2}$ kils., or about 88 lb. per ounce of 25 grams of seed hatched. The average price per kilog of cocoons was 7.53 francs for cocoons for spinning and 7.85 francs for reproduction of eggs. The total amount realised by sale of cocoons was 20,121,402 francs.

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Mixed with a solution of 10 per cent acid and 10 per cent alkali, bananas give a weak acid reaction. The bananas are subjected to the action of the solution for some days, the solution being gradually heated up to the boiling-point. The preparation may also be made with iodine or with a metallic salt; on using iodine a much richer and wider range of colours may be obtained. The dye thus obtained, according to the *Indische Gids*, can be used in the preparation of wool, cotton, leather, silk, feathers, etc., by using some tanning acid or the like. It is also stated that a considerable difference is made in the range of colours obtained according as to whether the fruit is more or less ripe.

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A Vienna engineer named Jeansch, addressing the members of the Institution of Civil Engineers, suggested a floating tunnel for the English Channel, to consist of ferro-concrete tubes, and to be placed a few yards below the surface, where the currents are slight. The tunnel, it is suggested, could be held secure by wire cables to the bottom of the Channel, and be constructed in a year at a cost of about £9,000,000. It is contended that such a tunnel would have considerable advantages over an underground tunnel, which would be a more difficult and more costly enterprise. It is added that similar tunnels would be suitable for the Straits at Dardanelles and Gibraltar.

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Since the inauguration of civilian aviation in Great Britain on May 1, 1919, until March 6, 1920, the records of the Handley Page commercial aeroplanes are as follows:—

Total number of passengers carried, 4,217
total amount of freight carried, 50,653 lb.;
total mileage covered, 82,428. The above figures include passenger flights at Cricklewood, London, in the United Kingdom and foreign countries, and passengers and freight carried on the London, Paris, and Brussels air services. On the Handley Page continental air service between September 2, 1919, and March 6, 1920, 764 passengers and 23,344 lb. of freight have been carried over a distance of 47,545 miles.

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What a tremendous loss to a country industrial strikes cause is shown by figures compiled in London regarding the big strikes in England. They show that from January 1 to November 30, 1919, the loss of working days from strikes reached the stupendous aggregate of 32,769,000, and if we add to these figures the unemployment caused to workers in other trades by the nine days' railway strike, the engineering strike, the Yorkshire miners' strike, the iron-moulders' and other strikes, the total does not fall short of 40,000,000.

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Professor E. Midgley, of Bradford Technical College, speaking recently of the defects in fabrics, declared that the standard of perfection was higher twenty years ago than at the outbreak of the war. He said that there is great opportunity now for the further application of chemical methods in cloth finishing, with a view to obtaining improved handle, appearance, firmness, and permanency of finish. No branch of the textile industry provides such opportunities for original research and experiment as does the dyeing and finishing section.

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A new form of electrical vaporiser has recently been placed on the market by a leading British firm of electrical manufacturers. Simple in construction, it consists of a well-made asbestos cushion, which contains a highly efficient electric heating element.

This cushion is mounted on a base which can be fixed in any desired position. For medical and fumigating use the base can, of course, be just placed in position, but where the vaporiser is to be used for industrial purposes it can be fixed with screws or bolted down.

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British banks are alarmed at the large volume of speculative investments, and have decided to curtail their customers borrowing by exercising a close scrutiny of proposed investments, and requesting reduction of overdrafts. The bulk of the investments in the present year have gone to cotton and shipping shares. Cautious financiers anticipate reductions of the profits in these concerns. On the other hand, the principal Atlantic shipping companies announce considerable increases in freight rates.

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During a discussion on the question of the embargo on the export of gold in the House of Assembly of the South African Union, the Minister for Railways (Mr. H. Burton, K.C.) said that the gold premium had resulted in an organized traffic in the smuggling of gold to India. Since the year 1914 the leakage had amounted to about £ 6,500,000. The position had grown more acute during the past few months, the leakage in that period having been about £1,000,000.

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A notification has been published in the District Gazettes under Section 9 of the Madras Village Courts Act, 1888 (as amended by Act II of 1920) directing the establishment of 157 panchayat courts in the districts of Chingleput, Trichinopoly, Anantapur, Tinnevely and Malabar. The largest number of courts are in Anantapur and Malabar districts in which no less than 63 and 49 of these panchayat courts are to be set up under this notification.

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Who were the first? Professor G. T. Morgan, lecturing to school teachers at

Finsbury Technical College, on the subject of the dye industry said he wished to repudiate a mistaken view that the dye industry was discovered in England and stolen by Germany. "I admit the Germans are capable of stealing anything," he said, "but we must give the devil his due, and not even the Hohenzollerns could have stolen the industry, because we never had it."

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Three tractors have been purchased by the Agricultural Department of Madras and ploughing demonstrations have been given at various places under the supervision of the Government's agricultural engineers. Further tests are being widely advertised with a view to interesting Indian agriculturists in the use of tractors. It is confidently predicted that India will ultimately prove a very good market for motor-ploughs and tractors.

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A bag-making factory will shortly commence operations in the neighbourhood of Johannesburg, according to a statement appearing in the Cape press. The company will be known as Textiles, Ltd., and will manufacture grain bags, coal bags, sugar pockets, bath mats, etc. It is stated that fibre is available within the Union in unlimited quantities.

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An official report quoted in the "Asahi" of 6th January states that the amount of steel sold during 1919 by the Government Iron Works to Government and private consumers amounted to 310,367 tons. This shows an increase of 13,172 tons over 1918.

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A Washington message says that the imports from Germany to the United States during February last amounted in value to 3,881,000 dollars, and the exports from the United States to Germany to 18,598,000 dollars.

TOPICS FROM ECONOMIC PERIODICALS.

SCIENTIFIC WORK IN INDIA.

Its Organization and Development.

Nature in an interesting article says:—

The reorganization and development of scientific work in India are now under consideration, and important and far reaching decisions on these questions will shortly be made by the Secretary of State. It has already been decided, both by the Government of India and by the Secretary of State, that large sums of money must be found at the earliest possible moment for the purpose of fostering the development of the Indian Empire by means of scientific research. The principle of State aid on a generous scale has been accepted, but the important question of the best method of utilising this form of assistance in the future development of India remains to be settled. These matters were referred to by the Viceroy on January 30 last in his speech opening the present session of the Imperial Legislative Council at Delhi. It is evident from the report of Lord Chelmsford's remarks which appeared in the 'Times' of February 6 that the Government of India is now considering large schemes of expansion in regard to the scientific activities of the State.

Two policies at present hold the field: (a) Centralisation under a proposed Imperial Department of Industries of the Government of India in which chemists, botanists, zoologists and so on will be formed into district, water-tight, graded services, each under the control of a departmental head; and (b) decentralisation under which the scientific workers at the various universities and research institutes will be given as free a hand as possible.

The policy of centralisation and the creation of graded scientific services have been strongly advocated by the Indian Industrial Commission, which was presided over by Sir Thomas Holland, formerly Director of the Geological Survey of India. It is favoured by a number of administrators in India who consider that some measure of official control is necessary for all scientific investigators, and it has also received the support of several of the scientific witnesses examined by the Commission. The arguments advanced by Sir Thomas Holland and his supporters in favour of centralised scientific services are set out in detail in chap. 15 of the Report of the Indian Industrial Commission, published last year

(H. M. Stationery Office; Cmd 51.) The nature of these arguments will be evident from a study of the principles and the rules which they suggest should be adopted for the formation and control of the new Chemical Service. It is proposed to proceed with the creation of this service as soon as the committee now dealing with this matter in India has submitted its reports.

The Industrial Commission considers that for administrative purposes the chemists now employed by the State in India, and at present distributed among the cadres of various services, should be brought together into one service to be called the Indian Chemical Service, and should be under the control, so far as their scientific work is concerned, of a senior officer styled Chief Chemist to the Government of India. The remaining members of the service would be divided into three groups—agricultural, mineral and organic chemists—each group being under the supervision of a Deputy Chief Chemist located at a suitable centre. The junior members of the group would be lent to Local Governments and to various Government Departments for periods normally limited to five years; they would carry out the routine duties required, in some cases including teaching, and undertake certain forms of research with the approval of the head of the services. All the members of the Chemical Service would carry on their duties on the following lines: (i) Whenever it is possible to lay down for any officer a programme of research work, such programme would not be sanctioned without the consent of the head of the service: (ii) the head of the Chemical Service would have power to inspect the scientific work of any of his transferred officers or to report thereon to the local authority: (iii) the results of scientific investigations would be reviewed by the head of the service, and would not be published without his consent. Ordinarily, such results would be given their first formal publication in the official journal of the service.

These details will enable men of science in Great Britain to understand how it is proposed that most of the future scientific work in India should be conducted. As soon as the organization of chemists is completed, the Industrial Commission suggests that the botanists, zoologists, and entomologists working in India should be formed into similar centralised services.

The present system under which research is conducted in India may be described shortly as one of decentralisation, the work being carried out at the various university colleges and at a number of independent research institutes under the control of the Government of India, the Local Governments, the Indian States, and trusts, of which latter the Indian

Institute of Science at Bangalore is the chief example. A large number of the most successful investigators working in the universities and at the various research institutes do not favour centralisation in separate scientific services, but consider that the present system should be developed and extended, and that in applied science the bond of union of the workers engaged should be the general subject investigated, such as agriculture or forestry, rather than the particular science involved. At present the investigators dealing with a many sided subject like agriculture are collected at agricultural research institutes, and now belong to the agricultural department. A similar method of organization obtains in forestry and at the centres of medical research like Calcutta and Bombay.

The present system has proved successful in practice, and the value of the work done in India in pure science, in tropical diseases, in agriculture and in forestry has been widely recognised. Decentralisation, therefore, has been justified by success, and a very strong case will have to be made out before the workers at the existing institutes are re-grouped in centralised services under the control, as regards their scientific work, of the proposed Department of Industries of the Government of India.

Increased financial assistance on the part of the State would enable the present universities and research institutes to be developed and more workers secured. With such facilities, there should be the greatest possible freedom for the investigators carrying on original work. The general conditions under which the researches are conducted should be made as attractive as possible, and the policy to be adopted should be one which would secure the very best men available, and the provision of adequate means for their work. For original scientific investigators little or no official control is needed, and they should not be constantly called upon to furnish interim reports and programmes of work to an official chief, or to obtain his formal sanction before undertaking an investigation or publishing the results of their work. Such formalities waste valuable time, lead to constant friction, and are altogether foreign to the spirit which should reign in all centres of creative scientific research.

Briefly stated, the case to be decided is one between the advocates of a system of rigid centralization and those who consider that in research work the man is everything, and that there can be no progress without freedom. Obviously, the conflict of opinion is a fundamental one, and much will depend on the wisdom and sympathies of the Secretary of State, with whom the final word lies, in deciding which policy is to prevail.

ECONOMIC NOTES.

INDUSTRIES AND COMMERCE.

Foreign Trade of Japan in 1919.

The following particulars have been furnished by His Majesty's Commercial Secretary at Yokohama:—

The following is not intended as a critical analysis of Japan's foreign trade for 1919; it is merely a foreword based on the scanty information at present available.

According to a summary of the Foreign Trade of Japan in 1919, published by the Department of Finance, the total trade of Japan proper was yen 4,168,487,000 up to 25th December: exports yen 2,042,258,000, and imports yen 2,126,229,000 showing an unfavourable balance of yen 83,971,000. This is the first adverse balance since the outbreak of the great war.

Exports register an increase of over yen 80,000,000 on the figures for 1918. Imports have advanced yen 458,000,000. The exports and imports of bullion are given as yen 5,054,000 and yen 285,147,000 respectively. This considerable import has practically all come from the United States of America within the last month. The movement of gold last year was, of course, small owing to embargoes in the chief markets of the world.

Trade was dull during the first part of the year owing to the general uncertainty which reigned after the conclusion of hostilities, but showed renewed activity after the Peace Treaty was signed. Another noticeable feature of the year's trade has been the Chinese boycott which started in May as a result of the Shantung deliberations of the Peace Conference, fell off in September from economic causes, and recrudesced in November owing to the Fuchow incident.

EXPORTS.

Shipments to the United States of America and to China have increased considerably in spite of the "boycott" in the latter country, but exports to Europe, Australia, South Africa, and South America, British India, Dutch East Indies, Indo-China, Siam, the Straits, Hongkong, and the Philippine Islands have fallen away materially. This means that Japan has not realised her opportunity and consolidated her position in the many markets which were thrown open to her manufacturers by European inability to compete during the war. She was obsessed by the desire of obtaining

quick and exorbitant profits, and paid too little attention to the quality of her output. Had she adopted a more prudent policy she would probably have been able to maintain her position in such markets, as India, Java, South America, and the Philippine Islands for many years to come.

The increase in exports is due chiefly to the shipment of manufactured goods: foodstuffs, raw materials, and semi-manufactured goods have fallen away. The considerable decrease in the shipment of foodstuffs was due to domestic shortage and decreased requirements of the Allied belligerents and the Chinese boycott. China is normally a large consumer of Japanese provisions. War prosperity in the United States of America is responsible for a very considerable increase in the export of raw silk, which exceeded yen 500,000,000 by the end of November, and showed an increase of over yen 180,000,000 on the figures for 1918. Other exports recording any material advance are cotton cloth, habutæ, matches, cotton underwear, glass, glassware, porcelain, braid, toys, woollen cloth.

IMPORTS.

Raw materials are responsible for most of the increase, then semi-manufactured goods and foodstuffs. Manufactured goods show the small advance of 12 per cent. The most striking increases are: raw cotton, rice, wheat, beans, wheat flour, sugar, condensed milk (in spite of recent local expansion), eggs, salt, tanning materials, printing paper, packing paper, iron ore, copper rails, motor cars and parts, electrical machinery, spinning machinery, fertilisers (particularly bean-cake and sulphate of ammonia), and petroleum.

The most noticeable decreases are in hemp and jute, gunnies, and copra (all largely due to the stoppage of war demands) and metals.

Broadly speaking, it may be stated that trade with European neutrals has increased and trade with the allied belligerents in Europe decreased. The reason is obvious. During the war, operations in such countries as Norway, Sweden, Denmark, and Holland were extremely difficult and practically cut off; and now old markets have been reopened and former connections re-established. Again, while hostilities were in progress there was a very strong demand from England, France, and Italy for foodstuffs and military supplies of a direct or indirect nature. This demand rapidly decreased after the signing of the Armistice, and owing to industrial unrest, shortage of supplies, high cost of production, and other causes, Europe has been unable to promote a healthy output of manufactures for this market.

PROSPERITY DUE TO ABNORMAL CONDITIONS.

The economic situation of Japan is pregnant with possibilities of danger. Much has been said and

written about the unprecedented prosperity of this country, but it is not clearly recognised that practically all this prosperity is due to abnormal conditions consequent on Japan's peculiar position during the war. The spirit of the nation has not undergone any radical change which would warrant alarm in competitive countries. It is true that Japan has attained a greater measure of independence and that her industries have showed considerable development; but hitherto, unknown evils, such as labour unrest and fictitiously high cost of living, have arisen as an offset. Added to this, there is a growing mania for speculation and company promoting out of all proportion to the needs of the country; the strong and rapid inflation of the currency has proved an excessive stimulation. Shareholders are improvident in the extreme, and manifest a feverish anxiety to obtain recklessly high dividends at the expense of sound provision for future development.

THE DRYING OF BANANAS.

Dr. W. Burns, Economic Botanist, Bombay, and Mr. P. G. Joshi, Superintendent, Ganeshkhind Botanical Garden, Kirkee, contribute an interesting article on this subject to the current number (Vol. XV, Part II) of the *Agricultural Journal of India*. They describe the preliminary experiments carried out in Bassein, a town on the west coast of the Bombay Presidency, and the difficulties met with. As the result of further experiments at Agashe the authors indicate a simple method of drying, one suitable to the most primitive conditions. If there were an assured market for the product vacuum driers and modern scientific apparatus would be desirable. In the meantime all they wish to show is that by a very simple apparatus a valuable and easily stored food can be made from a perishable fruit. The following is a summary of the experiments:—

"Bananas can be dried at other places than Agashe, and all varieties experimented with can be successfully dried.

Sun heat is sufficient.

Protection from dust and insects is necessary, and some sort of simple apparatus such as that described by us is required.

A good colour can be obtained by using a cardboard screen for the last two days of the drying.

The product should be stored in airtight tins or jars and examined periodically, throwing away bad bananas and drying again those likely to have been infected."

Since writing the above, the writers' attention was drawn to an article describing experiments on the drying of bananas in Jamaica. The main conclusions of these experiments of interest to India are :—

- (1) The sun-dried product is superior to the product artificially dried in a drying apparatus.
- (2) With a good supply of sound fruit at 1d. per lb. and a selling price of 6d. a lb. a profitable industry could be established in the West Indian islands.
- (3) Fruit merchants in the United Kingdom valued the sun-dried bananas at 6d. per lb. there wholesale in July 1919.

On 28th August, 1919, a sample of bananas dried in the above manner was sent by the authors to the Chamber of Horticulture, London, for opinion.

That body sent on the sample to a firm of specialists in the banana trade who reported as follows :—

Elders and Fyffes, Limited,
Head Office,
Bow Street,
London, W. C. 2.
14th November, 1919.

** Report on Dried Bananas received from the
Secretary, Chamber of Horticulture.*

"The tin box contained four small parcels, two marked 'Black Colour' and two marked 'Red Colour.' All four parcels are in perfectly good condition and sweet. An outstanding feature is the complete dryness of the fruit, in which it compares favourably with the Jamaican variety. All the fruit is of good flavour.

"The samples marked 'Red' are much brighter and more attractive in appearance than those marked 'Black' and the sample marked 'Red 1' is the best in every respect.

"During the past thirty years many attempts have been made to introduce dried bananas into this country, notably from the Canary Islands, but meeting with poor results the efforts have been short-lived.

"During the war small consignments were imported here from Jamaica and sold readily owing to the scarcity of other dried fruits, but at the present time, notwithstanding the continued shortage, the demand at remunerative prices is negligible.

"It is difficult to speak hopefully of the prospects for the future as it is thought that in normal times the competition of other products of a similar character will be to the disadvantage of the industry."

SERICULTURE.

Japanese Silk Trade in 1919.

Japan's export trade in silk manufacture during 1919 presented unusual activity, although the first half year was dull consequent upon a reactionary depreciation that followed the prosperous export during the war period :—

This was especially the case with the exportation of "chirimen," "kabeori," and other special kinds of silk textiles. Since the middle of the first half-year the demand for Japanese silk textile fabrics gradually increased in the United States, Canada, Australia, and India. On the other hand, the export to Europe considerably decreased owing to the continued depreciation of exchange, which hit the export trade of the empire with Europe all the time. The remarkable increase of the exports to North America, states the "Yokohama Chamber of Commerce Journal," more than compensated for the loss incurred on account of the decrease of exports to European countries, and, moreover, the sudden rise in the market price of silk yarns, which ruled very strong throughout the year, added to the almost unprecedented figures for the particular line of Japan's export trade for the year.

The export market witnessed no such marked fluctuations in market quotations as to disturb the market. Moreover, the continued high prices of silk yarns favourably affected the market prices of silk manufacture, which also ruled very strong throughout the year.

Especially active was the tone of habutaye market. Under the favourable circumstances the plain habutaye, which was quoted at about 15 yen per 100 momme about January and February, went up to about 35 yen about the middle of November, the highest figure ever recorded.

EXPORT OUTLOOK FOR 1920.

The outlook for the export trade is hopeful, with every prospect of further increase this year because of the labour troubles in America and other countries.

With prosperous exports and high prices the staple industry attained a remarkable development during the year, this being especially the case in Ishikawa and Fukui prefectures, the important centre of habutaye industry. In Fukui prefecture the production was something like between 40,000 and 65,000 rolls in the first four months of the year, but increased to over 100,000 rolls in July and August.

In Ishikava prefecture the increase was similarly notable, the figure swelling from about 50,000 rolls each in February and March to between 80,000 and 90,000 rolls each in September and October.

The export trade in silk manufacture, with habutaye as the most important item, reached its height during last summer and autumn, and, together with the continued advance of prices enhanced by the active exportation, the value of the exports reached an enormous figure. The total exports of habutaye for the eleven months ending 30th November amounted to 75,868,470 yen, these figures representing the shipments through the port of Yokohama only. Figures for the same period of other silk manufactures are 20,783,143 yen of "chirimen" silk, 21,609,188 yen of other silk textile fabrics, and 6,080,854 yen of silk handkerchiefs, making a total of 124,341,430 yen, showing an increase of 23,655,430 yen over the similar figure for the same period of the previous year.

SILK FARM AT BOWRINGPET.

The following is the Rearing Report of the Demonstration Farm at Bowringpet during March and April, 1920:—

Till very recently there was no mulberry cultivation in Bowringpet Taluk and many attempts were made to find one or two men at least who would take up the cultivation with interest. Though many persons expressed willingness to take up Sericulture, yet there was some diffidence but no one was willing about taking the initiative, and every one wanted some one else to begin, to show the way. During the last two Taluk Conferences it was explained that with ordinary care there was really no risk of failure or loss.

At last Mr. Namberumal Chettiar of Bowringpet, a Toddy contractor came forward and planted nearly $\frac{1}{2}$ an acre near Bowringpet Town with mulberry in the month of January 1920; this area was increased in the next month by one acre. The plants came up well as the care given to the garden was quite satisfactory. Mr. Chettiar had no previous experience of the silk worm rearing and the spinning lasted for two days.

The rearing operations attracted a large number of visitors, and considerable interest centred round this the first brood of silk worms reared in Bowringpet. Many people now wish to take up silk worm rearing.

Some worms died of grasserie in the last stage on account of high temperature and immaturity of leaves.

The total yield of the crop for 50 layings is 22 lbs. weighed on the 5th day and the Cocoons were fairly good. In spite of the unfavourable weather throughout the rearing period, the rearing was a successful one.

Mr. Namberumal Chettiar wishes to construct a separate rearing room, and will, it is believed complete it early, as he is keen about enlarging his operations, and conduct them on a commercial basis.

The Cocoons though well spun were not strong as the leaves used were of the first crop after planting.

The leaves were not at all well matured and nutritious. After the first pruning there is no doubt he requested the Department to arrange to conduct a rearing for him in a house which he placed at our disposal.

We responded by lending rearing appliances from Kolar, and deputing Practitioner Venkata Rao to work at Bowringpet and conduct the rearing for Mr. Chettiar. A rearing was started with 50 layings of the Mysore race and the worms hatched out on 29th March 1920.

The temporary rearing room was a tiled roofed one which used to get very hot in the day and the temperature during the rearing period ranged between 75° F—92° F. This had to be used, as no better room was available. Attempts were made to moderate the temperature, and secure the necessary humidity by a frequent and copious sprinkling with water.

The worms were coming up well and passed the successive moults regularly and were quite healthy and vigorous. Daily the worms were fed 12 times till the III moult, after which, the feedings were reduced to 10; six in the day and 4 in the nights. The worms began to spin on the 28th day after hatching about the leaves being suitable for the good development of the worms.

Out of the total yield of Cocoons nearly 1,500 were kept for seed to see the healthy state of the moths and the rest was stifled for being reeled. He is waiting for the rains after which he wants to take up cultivation for another two acres. The next rearing will be taken up during the month of June 1920, by which time there will be enough leaves to rear another brood.

Practitioner Venkata Rao worked throughout the rearing well, and the success is due to his earnestness. He has also shown the improved methods of rearing under the Hygienic conditions to the workmen of Namberumal Chettiar.

MYSORE ECONOMIC CONFERENCE. BOARD OF AGRICULTURE.

The following is a brief report of work done by the Board of Agriculture during the months of January, February and March 1920.

INTRODUCTORY.

In accordance with the terms of Government Order No. 514-86 E. C. 15-19-2, dated 19th July 1919, the Agricultural Committee was reconstituted into the 'Board of Agriculture' with 22 members for the calendar year 1920.

Two meetings of the Board were held—one in January, and the other in March.

Three members were elected for the Economic Development Board for the current year, and the budget estimates for the year, 1920-21 were also framed and submitted to Government for sanction.

PROGRAMME.

A programme for the remaining items was prepared and the following Sub-Committees were constituted to deal with each group:—

- (1) Increase of food production and expansion of cultivation.
- (2) Sanctioning takavi loans to ryots for house-building on approved lines.
- (3) Development of sugar-cane cultivation.
- (4) Development of agricultural co-operation.
- (5) Experimental work in coffee selection.

During the period under report, the first three Sub-Committees met and their recommendations were investigated, necessary action being also taken.

The other items of work on the Programme were dealt with individually.

INCREASE OF FOOD PRODUCTION.

Consolidation of scattered holdings:—The Board thought that before the consolidation of scattered holdings was taken up in settled areas, experiments should be carried out in new areas set apart from Amrit Mahal Kavals after the constitution of economic holdings. It should be a condition of such experiments that no further sub-division of holdings so formed should be made.

Settlement of criminal tribes:—An outline scheme for the formation of a Criminal Settlement in the State, drawn up by the Secretary and approved, with certain modifications by the Board was submitted to Government. The scheme recommend-

ed the formation of a settlement for such tribes within the State with a view to settling them to peaceful occupations and was estimated to cost about Rs. 43,000.

Regulating prices of food grains:—The Board, while unanimously agreeing to the necessity for prohibiting the export of food stuffs, were not in favour of controlling the prices of food grains.

COMMERCIAL CROPS.

Supply of manure to Sugar-cane Growers' Associations:—The Board agreed with the Sub-Committee for the Development of Sugar-cane Cultivation that an allotment of Rs. 50,000 be made in the next year's budget of the Agricultural Department for the purchase and distribution of oil-cake to sugar-cane growers.

Development of sugar-cane cultivation.—The Board recommend the grant of the following concessions by Government in cases where individuals, Co-operative Societies, or Joint-stock Companies wish to establish jaggery manufacturing plants:—

- (1) The deputation of an experienced Mechanic from the Department of Industries to look after and work the machinery and also of an Officer of the Agricultural Department to supervise the making of jaggery.
- (2) The salary of the Officers may be met by Government and this concession may be shown for a period of one year. These officers may be made to work under the individuals or the Joint-stock Companies or the Co-operative Societies concerned.

Creation of facilities to Joint-stock Companies to establish sugar-cane plantations on a large scale in places where canal irrigation is available:—The Board resolved to defer the consideration of this subject till the evidence recorded in the State by the Indian Sugar Committee was printed and circulated, and further decided to get the above evidence translated into Kannada and printed at their cost.

Creation of facilities for Tea cultivation:—A set of revised rules for the grant of lands for tea cultivation was framed and adopted, with a view to induce capitalists to take to this cultivation.

LIVE STOCK.

The Sheep Farm at Gottigere, Bangalore Taluk, which was in charge of the Board, was transferred to the control of the Agricultural Department as an Expert in Animal Husbandry was appointed by Government to work under the Director of Agriculture.

At the time of the transfer of the Farm *vis.*, 6th February 1920, there were 137 sheep on the Farm, consisting of valuable Merina and Dumba hybrids and country ewes.

HORTICULTURE.

As recommended by the Board, Government sanctioned loans of Rs. 1,000, and Rs. 2,000 to Messrs. Basappa of Holehanasvadi and Tenginakere Subramanya Bhatta of Tirthahalli, respectively, for raising nurseries of fruit plants and development of fruit cultivation.

The appointment of a Chief Horticultural Inspector was filled up in March. This Inspector is in charge of Bangalore District also.

COLLECTING AND SPREADING OF INFORMATION.

The Board approved of the publication of a brochure in Kannada on 'Arboriculture' prepared by the Conservator of Forests.

BOARD OF EDUCATION.

The following is a brief report of work done during March, 1920.

EDUCATION OF DEPRESSED CLASSES.

I. The Sub-Committee for the Education of Depressed Classes met on 24th March 1920, and passed resolutions to give scholarships to supply slates, books and other school requisites at Government cost, to open Boarding Homes, and to earmark a certain portion of cultivable land for the depressed classes. They also resolved that a special Trust Officer with the status of the Head of a Department with a special grant of one lakh of rupees was also necessary.

PHYSICAL EDUCATION.

II The Sub-Committee for Physical Education also met on 24th March 1920, and resolved to have an American Expert and to send the instructor of the Physical Culture Institute to America to learn western systems of Physical Culture with a view to appoint him as Director of Physical Culture later on.

MEETING OF THE BOARD OF EDUCATION.

III. The Board met on 27th March 1920, and discussed a few of the subjects on the agenda, viz., (1) continuance of the services of the Itinerant Lecturers, (2) Forms of Grants-in-aid, (3) Abolition of special vacation classes for training teachers of primary schools, and (4) Review of Kannada books available in the market.

The Board also elected Mr. M. Subbiah to fill up the vacancy on the Central Economic Development Board caused by the death of Mr. Basavaiya.

(Sd.) K. SRINARASIMHAIYA,
Secretary, Board of Education.

SHOWS AND EXHIBITIONS.

Cattle Show at Mudakatore.

In connection with the *Jatra* of Sri Mallikarjuna Swamy of Bettahalli, T. Narasipur Taluk, a Cattle Show was held at Mudakatore. The Show commenced on the 30th Jan. 1920, and continued upto 3rd February. There were 12,500 heads of cattle and a committee of ten gentlemen was formed to select cattle eligible for the award of prizes. Prizes in the shape of money and certificates were distributed by the Sub-Division Officer, Mr. T. Venkataramiah, B.A., to the owners of deserving cattle. His Highness the Maharaja of Mysore was pleased to pay a visit to the place on the 1st Feb. 1920.

QUERIES.

Hints to Correspondents.

Write on one side of the paper only. (2) Write each query on a separate sheet of paper. This will facilitate answering questions as in many cases they may have to be referred to experts. Put your name and address down on every such sheet. No attention will be paid to unsigned queries. (3) Drawings for illustrations should be on separate sheets of paper. They must be made in black ink only on white paper—not in pencil or colour—and twice the size they are intended to appear, especially reference, letters and figures. (4) Put titles to queries, and, when answering queries, put the number as well as the titles of the queries to which the replies refer. (5) No charge is made for inserting letters, queries, or replies. (6) Letters or queries asking for addresses of manufacturers or correspondents, or where tools or other articles can be purchased, or replies giving such information, cannot be inserted except as advertisements. No question is answered through the post. (7) Letters sent by correspondents, under cover to the Editor, are not forwarded and the names of correspondents are not given to inquirers. (8) As the space devoted to queries and replies is limited, they should be drawn up as briefly as possible. (9) To facilitate reference, correspondents, when referring to any letters previously inserted, should mention the number of the letter, as well as the page on which it appears. (10) All communications should be addressed to the Editor, *Mysore Economic Journal*, "Ringwood," Bangalore.

Reply.—Some time ago there appeared in this *Journal* a suggestion from Mr. S. G. Shastri to the effect that he wanted to conduct an experiment on rubber-seed.

Experiments in Europe and elsewhere have been recently performed and it has been found that the oil extracted from rubber-seed has been a satisfactory substitute for linseed oil in the manufactures of Paints, varnishes, linoleum, soap and other articles. It is also asserted that the cake can effectually be fodder to cattle and other live-stock.

The only fact in this respect to be ascertained is its comparative economical value to that of linseed, which is in abundance.

BOOKS IN BRIEF.

Comparative Education—*Edited by Peter Sandiford, M. A., Associate Professor of Education, University of Toronto. Messrs, J. M. Dent & Sons Ltd., Bedford Street, London, W. C. 2. Price 8sh. 6d.*

Too much praise cannot be given to this book. It is a survey of the Educational systems in each of six representative countries—United States, Germany, England, France, Canada, and Denmark. Each system is examined by a specialist in education and his views are set forth in clear and succinct fashion. In each an attempt is made to explain educational principles and tendencies in terms of social, economic, and political antecedents of each country under consideration. Each country has been chosen with a definite end in view. So much has been said of Education and educational progress in this country in recent times that it is hardly necessary to insist on greater knowledge on the part of those who wish to take part in discussions relating to education. Comparative studies of the kind now published under the editorship of Professor Sandiford ought to go a long way in making it easy for would-be educational debaters to know the conditions under which educational advancement is really possible. A useful corrective to ardent, if not radical, reformers would be the study of a volume like this in which are set out the factors which determine the character of the educational institutions of a country. Professor Sandiford deserves to be complimented on this latest work of his and the excellent manner in which it has been executed. Messrs. Dent, the publishers, deserve also to be thanked for this timely publication. We would commend the book to the attention of all interested in educational progress in India.

Personal Hygiene.—*By M. R. Samey, M.D., D.P.H., M.O.H., University Professor Emeritus of Hygiene. Messrs. Butterworth & Co., Calcutta & London.*

This is an excellent little book on the subject to which it relates. The publishers in their note rightly observe:—"Ideals of cleanliness of body, home surroundings, of village, town and city, are quite constantly enough held up before individuals as well as civic authorities but they are almost always pitched too high and hopelessly ignore the incidents of Indian Social life. High ideals, not accompanied by near practical aims and suitable methods of realization, are apt to be petrified into mere academic knowledge or blind worship of ideals not serving as motive power for life and action." These words fully indicate the objects and scope of the book. Dr. Samey is, as may be expected from

one of his knowledge and experience, thoroughly practical in his views. He knows too well the people he addresses himself to and so is never found to be committing the common error of putting forward impracticable ideals before them. His hints and suggestions are couched in simple and intelligible language, so that everybody can understand and follow them in daily practice. We would like the book translated freely into the leading vernaculars of the country. It is only then its real worth will be appreciated. We would note before concluding that the contents of this book were originally published in the *Madras Local Self-Government Gazette* and have been reprinted from it.

The State in Peace and War.—*By John Watson, LL.D., Litt. D., D.D., Professor of Moral Philosophy in Queen's University, Kingston, Canada. Messrs. James Maclehose & Sons, Publishers to the University, Glasgow. Price 7sh. 6d.*

We do not think that we can better state the scope and objects of this book than in the words of its author. The following paragraph from his preface sums these thus:—"In the following pages an attempt has been made to follow the evolution of political ideas from the origin of the City State to the rise of the modern Nation-State, and to give a concise statement of what seems to me to be the true principle of the latter. I have attempted to guard this principle from misconception, and specially to indicate the intimate relation of the State to the various subordinate organizations which it includes and which are essential to its perfection as well as its relation to foreign states and to the world at large. To this has been added a short statement of the regulations of civilized warfare, a reference to the character of the British Empire, and a consideration of the proposals for a League of Nations. I have in the main avoided all reference to the present war, contenting myself with indicating the opposing conceptions of England and Germany." Dr. Watson's study of the development of political theory is a fascinating one. Nor could it be well otherwise when we note to whom he owes his cardinal ideas—Green, Bosauquet and Caird. His analysis of the Modern State (Chapter IX) deserves special attention in these days. Equally important is his chapter (X) on System of Rights. In it are discussed some topics of supreme interest all the world over just now. The bibliography at the end of the book is a most helpful one. We should be glad to see the book attract the attention that it deserves both from the universities and the general public which is not content with the altogether ephemeral literature of the kind that now circulates in this country.

The Meaning of Reconstruction by Demos—Published by George Allen and Unwin Ltd. Ruskin House, 40. Museum St. London. W.C. 1.

"Demos," whoever he is, has produced a thought-provoking piece of work in this booklet of essays originally contributed to the *Athenaeum*. In it he considers the real purpose of reconstruction and some of its implications. He regards the development of human history as a history of conflict between Liberty and Authority. The war itself he regards as a part of this re-construction. He suggests that reconstruction should take note of the fact that this increasing struggle between Liberty and Authority will go on despite the cessation of war. No Reconstruction will be possible or feasible if it does not take note of this cardinal fact. He would base Reconstruction on Liberty. A policy based on Liberty would, in his opinion, mean a democratic policy, for liberty and democracy are twin principles. He puts his central idea thus: "Once we are clear that the goal is to make all men free rather than some men rich or to make all nations free rather than some nations great, we have an end towards which our steps can be deliberately directed, to the confusion of militarists, chauvinists and materialists, whose success in the past has been due to the lack of a sufficiently coherent ideal and policy embodying the principles of justice and freedom. Certainly a book to read and ponder.

Coconut, Kernels, Cocoa Planting, Cultivation, Expression, etc.—By Cap. A. O. Newland, F.R. Aist. S., F.I. D., etc., Messrs. Charles Griffin & Co. Ltd., Exeter Street, Strand London W. E. 2. price 6sh. net.

This is an excellent practical hand-book—one of Messrs. Griffins well-known Technological Hand-books, on the planting, cultivation and expression of coconuts, kernels and cocoa for the use of planters, financiers, scientists and other. Incidentally Cap. Newland, the author shows the resources which the British Empire has in regard to the supply of oils and fats. Greater exploitation is what is desired by him. His remarks on the value of the African possessions of Germany are both shrewd and informing. Those who desire for the latest information on the subject of the planting and expression of coconuts would do well to consult this book. The illustrations contained in it greatly add to its value. We heartily commend it to those interested in coconut planting in India.

An Empire Builder of the XVI Century—By L. F. Rushbrooke Williams, B.A., B. Litt., F.R. Hist. S., etc., Professor of Modern Indian History, Allahabad University. Messrs Longmans Green & Co., London, Bombay and Madras.

In this book Professor Williams draws a very pleasing picture of Babar. Of all the Moghals, Babar was perhaps the most adventurous, brave and manly. Professor Williams styles him a very gallant gentleman and so he was. The picture is well drawn, the lineaments are discernable and there are, so far as we have been able to make out, no faults to be seen in it. The labour and scholarship brought to bear on the work has thus been amply repaid—so at least we should think from the reader's point of view. Professor Williams has shown how research work in modern Indian history has to be undertaken, both the spirit and the manner of it. We should like to see the book widely read by students intending to make research work their life's occupation. Such students are, we are glad to note, on the increase and it is particularly necessary that they should start on right lines. Here is a book that will enable them to do that; it is more eloquent than dry lectures on "methods" in research work. We have read Professor Williams' introduction to the book in which he sketches the politics of India at the time of Moghul invasion. We think the sketch is an excellent one but it might, when a next edition is called for, as it will doubtless be before very long—be easily made less amateurish in its treatment of Vijayanagar kings. "Bakka" (on page 6) we take it is Bukka. Professor Williams relies for his material for this part of his introduction on Abd-ur-razzak's well-known account of the Hindu Kingdom. But so much light has been thrown on Vijayanagar Kings and Kingdom within the past twenty years or so that there is hardly any excuse for even Bukka appearing in a book of this sort as "Bakka." We write this solely with a view to enable Professor Williams to set right small blemishes of this kind which go to mar an otherwise excellent book.

Corporate Life in Ancient India.—By R. C. Majumdar, Lecturer in Ancient Indian History, Calcutta University. Published by Surendranath Son, Kamala Printing Works, 3, Kashi Mitter's ghaut street, Calcutta. Price Rs. 4.

Very high praise is due to the author of this unpretentious book. Mr. Majumdar has brought together here much valuable material on an obscure but much debated subject of ancient Indian life. We think he has stated his case with admirable self-restraint, that great trait of a good scholar. He has exploited his subject with care and has laid under contribution practically every source of information available. He has, moreover, fixed his attention on one single point and has not wavered from the path of strict historical research. It is a good sign of the times that scholars of this type are growing in this country. We think that Mr. Majumdar's work will be followed by many others of its kind on the many obscure points still awaiting research.

ACKNOWLEDGMENTS.

The Coming Great Change in Education.—Lecture by Captain J. W. Petavel, Principal, Maharajah Kassimbazar's Polytechnic Institute, Calcutta, at the Mysore Dasara Exhibition, 1919. Bulletin No. I. Board of Industries and Commerce, Mysore 1920.

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LABOUR CO-OPERATIVE SOCIETIES.

BY THE EDITOR.

THE growth of industrialism of the Western type in this country has been followed by the estrangement of Labour from Capital. The conditions prevalent in most of the industrial centres of India e.g. Madras, Bombay, Calcutta &c. show that labour is beginning to find its feet. In England, France, and other countries, they have tried to meet labour unrest in a variety of ways. One of the most popular methods we mean constructive—adopted in the countries named has been co-partnership. Even there, this method of winning over Labour has not been the success that it deserves to be. The experience gained by some industrialists in this line has been such as to inspire confidence in others. But still the practice has not gained that wide popularity that one would desire. It is unnecessary to go into the causes which have operated against the general acceptance of Co-partnership. The fact is there that it is looked upon with disfavour by Labour in some quarters and by Capital in others. Is there any other mode of bridging the gulf that divides Labour from Capital? Increased production being a *sine qua non* in the industrial field just now, it seems but right that we should draw attention to the chances of Co-operation in this sphere.

Recently we came across in the *International Review of Agricultural Economics* a reference to a rather interesting and suggestive note in the official Italian Gazette about the encouragement given to Labour Co-operative Societies. The Labour Co-operative Societies represent one of the most original forms of Italian Co-operation. Formed among workmen, especially among labourers in the buildings industry, they arose with the principal object of withdrawing labour from the yoke of common contractors and themselves accepting contracts for public works directly. In certain districts—Emilia, Romagna—where there is an excessive labour supply, they also aim at lessening unemployment, by obtaining the concession of works from the State and distributing the accompanying employment. These Co-operative Societies undertake by preference the making and upkeep of roads, bridges and canals, the construction of water works, the execution of works of land improvement and irrigation and the arrangement and transformation of lands, &c. Their development has been, it is stated, much helped by the passing of special laws as to the contracts of Co-operative Societies. Two recent decree laws allow them to expand and increase the scope of their activities.

The first of these laws amends the existing provisions relating to this subject with the object of facilitating the execution of public works of the State, simplifying the procedure of expropriation, the conclusion of contracts

and the granting of official approval, extending the competence of technical agencies, and making possible the desired revision of prices for works of which the execution is lengthy. It also introduces important facilities with regard to granting credits to the contracting firms and making consequent payments. Two of its articles provide for Co-operative Labour Societies. One of these lays down that the maximum value of a contract which can be ceded, by auction or by private treaty, to a Co-operative Society is 500,000 liras. In the case of federations of co-operative societies, this maximum is raised to 5,000,000 liras or double the total sum of the maximum contracts which the federated Society may accept. Contracts of a higher value than this maximum may be given to the federations, by private treaty, on the advice of the Higher Board of Public Work if the administration considers that the federations offer sufficient technical and financial guarantees. This decree, while it notably raises the maximum value of the contracts which may be given to these organizations, allows, as has been seen, by means of auction and of private treaty, a wider extension of their activity.

The second of the laws mentioned above concerns more especially works of improvement. It encourages and facilitates concessions of contracts, simplifies technical procedure and the granting of official approval, regulates relations between owners of land to be improved and the concessionaries of works of improvement &c. This law contains no special rule in favor of Co-operative Labour Societies, but the sum of its rulings will allow associations of this kind to take contracts for the work in question, which will, when agricultural improvements are united to works of Hydraulics, give many members of Co-operative Societies the opportunity of establishing themselves firmly on the land and transforming themselves from simple workmen to farmers.

The Italian laws show the possibilities of Co-operative Labour Societies. An attempt in this direction may not be altogether impossible in this country as well.

THE NEW COMPETITION IN BRITISH INDIA.*

BY THOMAS M. AINSCOUGH, O.B.E.,
*H. M. Senior Trade Commissioner
in India.*

THE war has brought about many changes in the character and direction of our export trade; but the statement may be made with as great truth to-day as in 1914—that of all the markets of the world India presents the greatest outlet for the products of British labour and enterprise. It is not generally realised that India was before the war, and still is, the most important market for United Kingdom manufactured goods. In last pre-war calendar year 1913, the United Kingdom shipped to India over £70,000,000 worth of goods of United Kingdom produce and manufacture, of which no less than £67,000,000, *i.e.*, 96 per cent represented manufactured articles. In the year 1917 the figures were £60,000,000 and £57,000,000 respectively. The measure of the value of the Indian market to the British manufacturer can be expressed in the percentage of the shipments to that market as compared with the total shipments to all parts of the world. In 1913, 16 per cent, and in 1917, 13 per cent of the exported manufactures of the United Kingdom were shipped to India. No apology therefore is needed in reviewing our position in the great Dependency, as it will be obvious that the prosperity of India and the maintenance of the purchasing power of the Indian people is of most vital importance to British industry.

TRADE DURING THE WAR.

Despite all the handicaps under which our trade suffered during the war, many of which are still operative, the United Kingdom has maintained her position in the Indian market

*With acknowledgments to the *Board of Trade Journal*.

in a marvellous manner. In the year ending 31st March, 1919, her share of the import trade was still 46 per cent, as compared with a pre-war average of 63 per cent; her share of the total trade was 35 per cent, as compared with 40 per cent, while the British Empire, taken as a whole, actually increased its share of India's overseas trade by one per cent. The recovery since March, 1919, has been most striking, and although the completed figures are not yet available, there is evidence that much of the ground which was lost during the war is being regained. The following figures of the total value of the imports into India from the three principal sources during the nine months, 1st April to 31st December, 1917, 1918 and 1919, will be of interest in this connection.

	1917.	1918.	1919.
	Rupees.	Rupees.	Rupees.
United Kingdom ...	632,134,982	573,132,502	663,170,541
Japan ...	116,313,727	252,539,787	140,290,143
United States.	83,423,288	104,099,854	188,700,376

INDIA NOW A COMPETITIVE MARKET.

While it is true that our trade with India is showing remarkable recuperative powers, there are many new factors which require to be carefully studied, and many changes have taken place in the past few years as a direct result of the war which tend to weaken our position in the market, and which call for special efforts and revised methods and organization in order to meet them. India must now be counted one of the competitive markets of the world. Before the war, in consequence of the old-established connections with the British merchant firms in the country, and also on account of the fact that the development of India had been conducted by British officials on British standards and methods, our trading supremacy was practically unassailed. Although Germany and Austria had increased their shipments in the years immediately preceding the outbreak of hostilities, these were not on a sufficient scale to cause any uneasiness, and British

exporters very largely controlled the market in manufactured goods. During the war, however, owing to a great number of causes, such as the diversion of British industries to war production, the shortage of tonnage etc., etc., buyers in India were unable to secure their requirements from the United Kingdom, and consequently were forced to seek other sources. Buying offices and agencies were established in the United States and Japan, and these two countries were enabled by force of circumstances to secure, without particular effort, a stronger footing in the market than could possibly have been acquired by years of effort in normal times.

AMERICAN COMPETITION.

In 1913-14. American shipments to India only amounted to just over £3,000,000, of which 50 per cent consisted of mineral oils and the balance principally iron and steel, machinery, hardware and cotton piecegoods. In 1918-19 American shipments stood at nearly £11,000,000. During the past twelve months a further great increase has been made, principally in iron and steel, machinery, hardware, motor cars and provisions. Many causes have contributed to this expansion, the principal ones being:—

- (1) The inability of the established British exporters to supply the market owing to war conditions.
- (2) The establishment of a few powerful American distributing firms in India, the number of American commercial travellers who are now visiting the country, and the systematic despatch of catalogues and commercial literature of all kinds.
- (3) The increased interest which is being taken by American manufacturers in export trade, which is being reflected by the improved facilities now being given by American banks, shipping companies, etc., etc., and also the adaptability which is being shown to the requirements of the Indian market. Before the war American makers had the reputation of being most conservative in their terms and methods. They are now studying the requirements of India and have consequently greatly strengthened their position.

- (4) Improved shipping facilities from both the Atlantic and the Pacific coasts. The inauguration of a direct monthly service between San Francisco and Calcutta has greatly stimulated the export of Californian canned and bottled provisions.
- (5) The favourable economic position of the United States at the close of the war, which enabled American works to resume their normal peace-time activities almost immediately after the signing of the Armistice. During the last two months of 1918 and the early part of 1919 firm quotations for early shipment were made by American makers, at a time when British manufacturers were unable for many months to quote firm rates and give hard-and-fast deliveries. It is true that American prices have since risen enormously and early shipment is now impossible to secure, but very considerable orders were placed last year, which will swell the American volume of trade for some time.

THE NEW COMPETITION.

There is no doubt whatever that American competition has come to stay. A determined effort is being made to secure a large share of the valuable trade of India in steel and steelwork, machinery of all kinds (including machine tools), mill stores and hardware, canned provisions, motor cars, lorries and cycles, and lumber. It is impossible at present even to estimate their probable future success when the usual United Kingdom suppliers are in a position to quote normal prices and deliveries, and when the usual channels of trade are opened up. This will entirely depend on the ability of our makers to quote competitive rates. In my "Report on the Conditions and Prospects of British Trade in India at the close of the War" will be found considered suggestions as to the methods United Kingdom firms should adopt to meet this competition, and I shall be glad to give advice to individual firms who may care to approach me while I am in England. To summarise briefly, it may be stated that the competition of America and Japan has largely revolutionized buying methods in

India during the war period. Many United Kingdom makers and export houses, prior to 1914, considered that it was a waste of time and money to leave London, as they were able to secure all the orders they wanted from purchasing agents in the United Kingdom. This policy, although not progressive, was understandable so long as we retained the virtual monopoly of the trade. India to-day must be considered as a highly competitive market, and requires to be treated with as great and painstaking attention as any other market, where we may be struggling to secure a fair share of the trade. Assuming that our industrialists are in a position to quote competitive qualities, prices and deliveries, the only way successfully to meet American competition is to be actively represented by a trained staff in India, whether by the maintenance of the exporter's own branches and distributing organization, or by the employment of energetic agents aided by salesmen and experts from the home works.

JAPANESE COMPETITION.

The most remarkable and significant feature of India's import trade during the war has been the prodigious expansion in imports from Japan. This will be seen from the following figures of the total values of imports from Japan during the years 1913-14 to 1918-19.

1913-14 ...	£3,187,000	1916-17 ...	£8,889,000
1914-15 ...	£2,966,000	1917-18 ...	£12,174,000
1915-16 ...	£4,998,000	1918-19 ...	£22,349,000

As I indicated in a report last year, the figures for 1918-19 probably indicate the high-water mark of Japanese exports to India for many years. It is now certain that Japanese shipments during the past year declined enormously, and it is hoped that as British suppliers are gradually able to make deliveries, the use of Japanese substitutes will be discontinued. A great portion of

Japan's increased share of the trade will undoubtedly remain in her hands, and a brief comment on the subject will therefore not be out of place.

In 1918-19 Japan occupied the second place in India's import and export trade. Her shipments to India in that year (which is the last complete year of which we have as yet received records) amounted to over £22,000,000 as compared with £51,000,000 from the United Kingdom during the same period. In 1913-14 the corresponding values were £3,000,000 and £78,000,000. The leading imports, in order of importance, comprise cotton yarn and piece-goods, 47 per cent; silk manufactures, 6 per cent; matches, 4 per cent; iron and steel; hardware; cotton hosiery; brass, bronze etc.; chemicals; paper; instruments and appliances; tea chests; paints; beer; apparel; woollen manufactures; glassware; machinery; cement; earthenware; haberdashery; manufactures of wood; toys; stationery; toilet requisites, etc., etc.

Before the war the share of Japan in the import and export trade of India was only 2½ per cent and 7½ per cent respectively, and her manufactures did not come into direct competition with United Kingdom goods. The war, however, gave Japanese manufacturers an unique opportunity. Owing to the difficulty of securing supplies from the United Kingdom and other European countries, the whole of the markets of the East were open to Japanese products. Competition was largely eliminated in many articles, and, so far as India was concerned, Japanese imports of cotton textiles, metals, machinery and engineering supplies were encouraged in order to meet the great shortage. The principal Japanese overseas banks opened branches in Calcutta and Bombay. Direct lines of steamers were inaugurated between Japan, India, and all parts of the world. Prominent Japanese merchant houses opened branches in Calcutta and Bombay. Com-

mercial travellers and inquiry agents came over in large numbers, and every importing merchant in India was flooded with price lists, catalogues and offers. Japanese stores are now noticeable in every fair-sized town in India, and individual Japanese are to be found in the most remote parts of the country.

FUTURE OF JAPANESE TRADE.

Japanese imports have very largely consisted of cheap, showy articles for the bazaar trade, which have replaced German and Austrian goods of similar type. These articles have not, as a rule, competed with British goods. So far as can be ascertained at present, Japan will probably retain this trade as—owing to heavy taxation and labour troubles—the cost of production in the Central countries is bound to increase, and the articles in question are peculiarly suited to Japanese conditions of industry. These remarks also apply in the case of matches and silk products. Japanese minerals, such as copper, sulphur and brass, will probably continue to be imported in fair quantities. There is bound to be a considerable decline, however, in such articles as electric cables, wire and accessories; paper, hardware, iron and steel, machinery, cutlery, paints, apparel and haberdashery, beer, tea chests, cement and chemicals. It is to be anticipated that there will be greater competition than was apparent in 1913, but the imports during the past few years have been inflated solely on account of the shutting off of normal supplies and not on the grounds of better quality or more economic production in Japan; so that British makers—provided that their prices are competitive—should regain their position in these trades.

COTTON YARNS AND PIECE-GOODS.

It is in Great Britain's staple trade with India *viz.*, cotton yarns and piece-goods, that the most serious inroads have been made, and that Japanese competition in the future is likely to be most permanent and insistent. In 1918-19 the relative proportions of the

quantities imports from the two main sources of supply were as follows:—

Imports.	From the United Kingdom Percentage.	From Japan Percentage 71.6
Cotton yarns ...	25.2	71.6
Cotton piece-goods—		
Unbleached ...	64.3	35.5
Bleached ...	95.5	3.7
Coloured, printed, or dyed ...	88.5	9.2

The imports of cotton yarns and cloths during the year ending 31st March, 1920, have, it is believed, fallen off considerably, but there is little doubt that certain classes of Lancashire goods will be faced with increasing competition in the future. The entry of Japanese bleached, dyed, printed and coloured woven goods into the market on a fair scale is an earnest of the competition which may be felt in later years when the extensions to the machinery and plant in Japan, now either planned or in execution, become operative. The fact that Lancashire can barely cope with the volume of export business at present offering does not affect the question. When the world's overdue demands for textiles have, in course of time, been met, it is only to be expected that keen competition will again arise, and the recent enormously increased capitalization of Lancashire mills will have, to some extent, discounted the impregnable financial position of the Lancashire industry.

DEVELOPMENT OF INDIAN INDUSTRIES AND ITS SIGNIFICANCE.

Mention must be made here of the new era which is drawing for India—the era of industrial expansion, during which the great Dependency will gradually take her place as an important manufacturing country and a valuable industrial asset to the Empire. The visitor to India to-day would see a remarkable change in its industrial position and in the outlook of its business men as compared with 1913. This is directly attri-

butable to the lessons taught by the war. The difficulty of securing supplies from the United Kingdom, together with the risk of an interruption of communications by sea, has brought home to officials and businessmen in a most forcible manner the great danger of any outlying portion of the Empire being dependent on the Mother Country, not only for the munitions and allied manufactures necessary for self defence, but also for the vital requirements of its industrial life. When war broke out it was found that practically every industry in the country was dependent on overseas supplies not only for its machinery and plant but also for the stores and materials used in its daily working. The work of the Indian Munitions Board during the war operated as a great stimulus to Indian manufacture. This was followed by the industrial share boom of 1919, when hundreds of companies were floated both in Calcutta and Bombay for local manufacture of all kinds. On all sides in India one meets a firm resolve to make the country as self-supporting as possible.

THE FUTURE.

It will be observed, therefore, that considerable changes are likely to take place in the character of the import trade in future, which will require many re-adjustments by British exporters to India. The import trade in several articles is bound to decline, and the competition in many more will be exceedingly acute. India, however, stands at the commencement of an era of great expansion. The increase in her wants is likely to be so great that the general volume of our trade with her is likely to increase rather than diminish. Although there will be some changes in the character of our shipments, I look forward with confidence to a great expansion in our export trade to India when the difficulties and pre-occupation of reconstruction in Europe have been met, and particularly when labour conditions at home enable British manufacturers to quote competitive prices and to give reasonable deliveries.

The extension of industries in India will not only increase the general prosperity of the country, and thereby raise the standard of living of the people, but will tend in the long run to raise the standard and widen the range of commodities imported from overseas, and will make the country a more valuable member of the Empire than she has ever been hitherto.

CO-OPERATION IN MYSORE, 1918-19.

BY "RUSTICUS."

MYSORE was no more fortunate than the greater part of British India in escaping the unfavourable agricultural and economic conditions and the epidemic of influenza which will make 1918-19 a year of evil memory throughout India for a generation to come. The extent to which influenza hampered the working of the co-operative societies in Mysore last year can be gauged from the fact that it carried off about two thousand of their members. It is, therefore, distinctly encouraging to find that, in such a bad year, the number of societies in the State increased from 1097 to 1233, the number of members from 81,168 to 84,425 and the working capital from Rs. 65 lakhs to Rs. 71 lakhs. That the increase in membership and working capital was not proportionate to the increase in societies is explained partly by the losses due to influenza and partly by the removal of over a thousand members of existing societies whose persistent default had made them a source of trouble and weakness to their societies. As regards individual districts, Bangalore easily led in respect of societies, membership and working capital whilst Kadur was equally easily a bad last under all three heads. The registration of only nine societies was cancelled during the year which is the best possible evidence of the care taken to start societies on a sound basis in the past.

The Mysore Report invariably contains a number of interesting tabular statements but we are sorry to see that it does not yet contain what we regard as the most important statement of all, that showing the total amount of overdue loans outstanding whether to central banks or to primary societies at the

end of the year under review. The Registrar explains that it is impossible to give the figures as they have not been supplied by societies. They are, as far as our knowledge goes, invariably given for most, if not all British Provinces and there seems no reason why they should not be obtainable in Mysore which is in no way behind British India in the standard of administration of its Co-operative Department. Mr. Ranga Rao promises to give figures in his next Report showing the total demand, total collections and total balance. This will be an improvement on existing practice but the essential information in regard to the soundness of the co-operative movement in Mysore will still be lacking unless the statement shows how much of the total balance is overdue. On the basis of figures collected in the course of his inspections, the Registrar states that, in normal years, about eight to ten per cent of the loans outstanding are overdue. As a result of the unfavourable conditions of last year, he puts the figure of overdue loans at the end of the year at 15 to 18 lakhs of rupees or about 25 per cent of the total loans outstanding. We are inclined to regard this as an optimistic estimate, for the loans issued during 1918-19 amounted to Rs. 54 lakhs, repayments to Rs. 49 lakhs and loans outstanding at the end of the year to Rs. 66 lakhs. The loans outstanding at the end of the year were thus about twelve lakhs more than those granted during the year and, unless loans are granted for a longer period in Mysore than they are elsewhere, we doubt whether the percentage of loans overdue could have been as low as 25. Of the loans issued, Rs. 34½ lakhs were for productive purposes, Rs. 17 lakhs for repayment of prior debts and Rs. 2½ lakhs for non productive purposes. The Registrar regards the grant of loans for the liquidation of prior indebtedness as a doubtful, if not objectionable, practice and hopes that it will be possible to eliminate this feature from societies altogether if the scheme for land

Mortgage Banks now under the consideration of the Mysore Government comes into effect. We disagree with him on this point. The true object of co-operation is the encouragement of thrift and one way, and a good way, of doing this is to substitute for the harsh terms of the money lender the easier conditions of the co-operative society. We admit that this principle can be carried too far and consider it eminently desirable that the circumstances in which the prior debts were incurred and also their relation to the ability of the debtor to pay them off within a reasonable period should be carefully examined before he is admitted to a co-operative society. But we hold that it is eminently undesirable that the members of co-operative societies should be indebted both to moneylenders and to their societies though we fear that it will be a very long time before this ceases to be the case in India. We should have thought that the evils of double indebtedness were apparent from the investigation into the economic condition of the members of the co-operative societies which has been undertaken by the Mysore Co-operative Department and has now been in progress for three years. 90 societies were examined during the year bringing the total number examined since the enquiry commenced, up to 270. The operations of these 270 societies extended to 1,300 villages with a population of 680,000. The societies had 18,300 members of whom 6,800 were returned as having no debts. The remaining 11,500 members at the time they joined their societies, were indebted to the extent of Rs. 30½ lakhs which was, of course, all due to money lenders. Their total assets amounted to Rs. 143 lakhs. At the time of the investigation, the total debts of the members amounted to Rs. 32 lakhs of which Rs. 14 lakhs were due to societies and Rs. 18 lakhs to money lenders. The total assets amounted to Rs. 166½ lakhs. In the previous two years, the indebtedness was divided more or

less equally between the societies and the moneylenders. It will be seen that, in the year under review, far more was due to the moneylenders than to the societies. The figures are highly instructive. As far as they go, and for reasons which we have pointed out in previous reviews of the Mysore Reports, it has to be admitted that they do not go very far, they show that co-operative societies, whilst they have increased the assets of their members—and here the general rise in money values during the last two or three years has to be taken into consideration—have done nothing to decrease their indebtedness. One reason for this is, we are convinced, that the members are in debt to two masters and that the moneylender, annoyed at losing business and thinking that the co-operative society will come to the rescue, is not as lenient as of yore. The figures also seem to shew that, in a bad year such as last year, the moneylender is in a better position to help the cultivator than is his society, which is, to say the least, a discouraging feature after so many years of co-operative work otherwise, it is not apparent why the indebtedness to him last year should have increased so greatly compared with that to the co-operative society.

Of other features of the Report, the most interesting is perhaps the effort which is being made to develop the agricultural and industrial side of co-operation. The number of agricultural and industrial societies increased from 43 to 72. Of these, exactly half are weavers societies, 13 are societies for the supply of manure and agricultural implements, 6 are ricehulling societies and 4 are sericulturist societies. Mr. Ranga Rao admits that the abnormal conditions of the year prevented anything like pronounced progress being made but much spade work was done which should have proved valuable in the improved conditions of the current year. The appointment of separate Inspectors for the organization and supervision of agricultural, industrial and weavers societies respectively is a step in the right direction, for

there is no doubt that these societies need more careful nursing at the outset than credit societies. The complete failure of the jaggery manufacturing societies and the almost complete failure of the rice hulling societies are evidence of this.

As our readers are aware, we are not at all optimistic in regard to the efforts which are being made by the Co-operative Department in various parts of India to assist the weaving industry. In our view, the sooner it is recognized that hand loom weaving, except to a limited extent in the case of special fabrics, has no place in present day industrial economy and must inevitably share the same fate in India as it has met in Great Britain, the better it will be for all concerned. The steps which are being taken to help the weavers in Mysore should go far to shew whether this view is correct or not. The Bangalore City Weavers Society has been reorganized and given a cash credit of Rs. 50,000 with the Bank of Mysore. Its membership has increased in consequence from 68 to 197 and its share capital from Rs. 2,094 to Rs. 5,280. Its profits last year amounted to Rs. 2,518. Another weavers society in Bangalore has been granted a loan of Rs. 5,000 by Government and made a profit of Rs. 1102. As a result of the recommendations of a Committee presided over by Sir Alfred Chatterton to investigate the condition of the weavers, the constitution of twenty credit societies for weavers was altered in order to enable them to supply their members with yarn, dye stuffs and other raw materials, to provide them with improved looms and patterns and to arrange for the marketing of the manufactured goods. Fourteen other societies of the new type were started during the year so that, with the two societies in Bangalore mentioned above, Mysore has 36 weavers societies in all. Purchases during the year amounted to Rs. 426 lakhs and sales to Rs. 463 lakhs. The societies may, therefore, be considered to have made an auspicious start. It is to be hoped that they are now being supervised by an Inspector with knowledge of textile work—an appointment which the Government rightly insist in their review should be made at once.

As usual, the Government review of the Report is evidence of the keen interest which is being taken by the highest authorities in the State in the progress of the co-operative movement.

NOTE ON TAPIOCA CULTIVATION.*

BY M. GOVINDA KIDAVU.

Assistant Director of Agriculture, Madras.

THE climatic conditions obtained in South Kanara are unsuitable both for cholam and cumbu which are accustomed to dry and mild climate. These crops are irrigated when raised in summer on garden lands. Irrigation facilities do not exist in South Kanara and where the dry land soils do not retain moisture as elsewhere. Irrigation even if attempted must for this reason be too expensive for the crops and which after all are of minor importance and quite foreign to the West Coast districts. Such being the case the sowing season is restricted. It must be May-June or October-November. If sown at the first season the heavy south-west monsoon rains frustrate their growth at the early stages and spoil the earheads later; and if attempted at the second season they cannot stand the severe drought of the succeeding months. This was the experience on the Taliparamba farm.

But in tapioca a suitable crop is found. It is a root crop containing excellent starch of great nutritive value. It is extensively cultivated in Travancore and Cochin. In recent years when the price of rice went high the cultivation has extended far and wide in Malabar district giving great relief to the poor and a good source of income for the well-to-do. The season and soil conditions of South Kanara are very similar to Malabar and vast areas of dry land quite suitable for the cultivation are also available. It is, therefore, proposed that the crop may be tried on a large scale and the food problem partially solved. The crop may be cultivated as described below:—

*Leaflet No. 7 issued by the Madras Publicity Board.

- (1) *Soil and drainage.*—The crop is grown in all kinds of soils which are well drained. It is a common crop in the sandy tracts of Pon-nani taluk and laterite slopes and valleys of the other taluks of Malabar. In virgin red loamy soils the crop yields very heavily. Drainage is a very essential condition for the success of all crops. This is particularly true of a root crop like tapioca. The land which would not admit of free drainage should never be selected for the cultivation.
- (2) *Season.*—This commences with the outburst of the south-west monsoon and extends up to October according to the nature of the soil. In low-lying situations where there would be sufficient moisture in the hot weather and too much of it in the monsoon, planting may be delayed up to October. But the best time for planting in high-lying dry lands would be July-August.
- (3) *Setts for planting.*—The crop is propagated by planting the stem. Green stems having very close leaf scars hardy and less pithy and as a consequence least liable to white ant attacks are to be selected. They are cut into setts, 6 to 9 inches long, and the bottom ends which go into the ground are dipped into ashes and are pressed down into the soil leaving about 3 inches above ground. The planted setts are to be covered but lightly with paddy straw or some dried leaves.
- (4) *Preparation of land and systems of planting.*—There are three systems of planting, namely (a) ridge, (b) mound, (c) flat.
 - (a) *Ridge.*—In this system the ground is ploughed two or three times. The turfs and weeds are collected and heaped in rows 3 feet apart. From between the rows earth is taken and thrown on either side, covering the turf so as to form ridges about 1 to 1½ feet high leaving just a foot wide trench in the middle. On the crush of the ridges setts are planted 2 feet apart.
 - (b) *Mounds.*—Ridges are formed as above, but narrow cross channels are made separating the long ridges into little mounds. Each of these little mounds receives a sett.
 - (c) *Flat.*—In this system the ground is well dug with mamutti 1 to 1½ feet deep. First a furrow is made close to the boundary bund, and leaves are applied along the furrows. The first furrow is then covered with earth taken out for making the second furrow and this latter is covered with the earth from the third furrow. Thus the whole field is worked up. Along the row supplied with leaves as stated above, setts are planted. The same distance between setts, namely, 3 feet by 2 feet, is maintained in all the three systems. The flat system is the best; the heaviest yield is obtained when this is followed.
- (5) *Manuring.*—In virgin lands much manuring is not necessary for the first trial. The crop is an exhausting one and as such it requires heavy manuring. A handful of a mixture of well-rotten

cattle manure and ashes is to be applied to each sett either at the time of planting or six weeks after, at the time of hoeing and weeding. The fish manure compost at the rate of one handful per plant has given excellent results.

(6) *After cultivation and harvest.*—

The crop has to be hoed and weeded twice at intervals of about two months. It is ready for harvest after eleven months. If there is sufficient moisture in the soil, harvest can be done by pulling out the stems. The broken roots, if any, are dug out separately. The yield varies from five to ten thousand pounds per acre. The value of the yield at the present price of one rupee per maund of 28 lb. would be over Rs. 200. The roots must be washed and skin removed. Then it may be cooked and eaten. It would be advisable to screen off the water in which it is boiled. For marketing purposes roots are cut into chips after washing and dried well in the sun. In this condition large quantities of roots are exported from Cochin and Travancore. When the roots are not required for immediate use they can be preserved long, when dried, as stated above. Out of the tapioca flour nice cakes can be prepared according to one's taste.

BHATKAL: ITS PAST AND PRESENT.

BY G. A. CHANDAVARKAR, B.A.

H. E. H. the Nizam's Educational Service, Hyderabad.

CONSEQUENT on the contemplated harbour scheme of Bhatkal and the construction of a railway line connecting it with the Mysore territory, that little sea-port town has been for the past few years looming large before the public eye. It is slowly emerging from insignificance and oblivion and if ever the scheme becomes an accomplished fact, that little sea-port will, in all probability, attain one day the eminent position of a great commercial emporium of the East. Its historical associations and traditions demand a divulgence of its past history. The essential conditions of economic prosperity and commercial greatness require a careful study of the industrial potentialities of the town and the surrounding country, as also of the productive capacity of the people inhabiting those parts. With the realisation of the hopes of the Mysore *Durbar* to find an outlet to the sea and to develop simultaneously the natural resources of the adjoining territory called *Malnad*, new problems, economic, social, educational, nay even political, will arise and press for solution. For an effective solution of these, a study of the past history of Bhatkal may not be unnecessary. Surely its interest is something more than mere academic. While it may arouse emotions of legitimate joy and pride amongst some of our readers, it may afford some food for reflection to traders, businessmen and even statesmen. We, therefore, propose to take a brief survey of the past history of Bhatkal in broad outlines and venture to make a few observations on its present economic condition.

EARLY HISTORY.

Bhatkal, the southern most seaport of the Bombay Presidency, did in times of yore

occupy a prominent position and attract many enterprising traders. The term '*Bhatkal*' seems to be a corrupted form of the Konkani term '*Vatkole*' meaning 'round'. 'V' is easily interchangeable with 'B' in many Indian languages as it is in Sanskrit. *Vanga* became *Banga* as *Vishnu* became *Bishnu*. So this *Vatkole* was pronounced as '*Batkole*', and in the writings of the Portugese writers and travellers, it is often referred to as '*Baticola*'. This 'roundness' probably refers to the circle of hills surrounding the town. If our readers should feel inclined to allow us a flight in the regions of imagination of uncertain derivatives we should like to draw their attention to another fact. This part of the country abounds in a kind of shrubs which yield a kind of sweet little fruits called '*Patakola*' in Kankani, the language of the place. It is probable that a country abounding in '*Patakols*' might have taken its very name from these edible fruits. '*Patakal*' might easily be spoken of as '*Bhatkal*', '*Pa*' and '*Ba*' being letters of the same class.

The *Puranic* legends describe this narrow strip of the west coast land as having been colonised by *Parashuram*, the incarnation of *Vishnu* and hence this part is also known as *Parashuram-Srushti* a country evolved and created by *Parashuram*. It is also believed that *Ravana*, the King of Lanka, was the ruler of these parts. From the stand-point of modern history we seem to tread on safer and surer ground when we come to the times of the early *Chalukyas*. The geographical situation of the coast-towns of *Kerala-Desha* or modern Kanara, has greatly affected the course of history. The high mountain-ranges of the *Sahyadri* have isolated this coast-strip and facilitated the formation of small kingdoms held by chiefs owing nominal allegiance to some inland stronger Government. There was no possibility of any one dynasty ruling for a considerably long period. In inland countries there was at times a strong ruling power but the

local chiefs must have found it very convenient to rise and fall in rapid succession. The inland kings who held sway over Kanara and the coast-towns of whom we can know something in the earliest period were the *Kadambas* of *Banavasi*, (now in Sirsi Taluka) who were followed by the early *Chalukyas*, the *Rashtrakootas*, and the Hoysalas. Of the Devagiri Yadava Kings who ruled between 1,188 and 1,318 *Ramachandra* seems to have held sway over Bhatkal from 1,271 to 1,308. In the 14th century the Vijayanagar kings extended their power as far as Kanara and under *Narasimha II* (1,487--1,508) a new enterprising European Power appeared on the scene and the history of the Kanara coast-towns in general and that of Bhatkal in particular took a different turn altogether. Upto the eventful year 1,510 Bhatkal was gaining year after year in commercial importance as the chief sea-port for trade in pepper, rice, sugar and iron. Many ships from Ormuz used to arrive there to carry on trade in spices and rice. But when the Portugese captured Goa this trade was slowly diverted to this their new capital and Bhatkal then entered upon its chequered career both historically and commercially. A maritime power could easily do and undo things which it was impossible for the local chiefs to resist. Many a time the Portugese who prematurely gave up trade for political power invaded this coast-town and of all these, the invasion of Martin Alonzo deSouza in 1,542 seems to have been most disastrous. In spite of these depredations and the setting up of a rival sea-port town at Goa, Bhatkal continued to maintain its commercial greatness as is evident from the testimony of Doarte Barbosa a Portugese traveller himself. In the year 1,514 he gives the following interesting account of Bhatkal:—

"30 miles further from Honavar on a small river near the coast was the large town of Batecola, of very great trade inhabited by very commercial Moors and Gentiles. The town stood on a level populous country and was without walls. There

were many gardens round it, very good estates with fresh plentiful water. The town paid a yearly tribute to the King of Portugal. The Governor named Damaquati—(Dharmakrita) was rich in money and jewels. He called himself king but ruled in obedience to his uncle the King of Narasing. Many ships gathered there from Ormuz to load very good white rice, sugar in powder of which there was much iron, some spices and drugs of which myrobalans were the chief. Formerly many horses and pearls came to Batikola but they now went to Goa."

Whence came these valuable products would be an interesting investigation for a modern industrialist. Surely the country now known as *Malnad* in Mysore, the majestic Sahyadris, as also the inland countries must have produced them and Bhatkal must then have served for them a convenient outlet.

About the year 1,560 the Jains rose in power at Bhatkal and to this day their temples and bridges stand as monuments of their great architectural dexterity. Even so far back as 1,450 *Channa-Bhaira-Devi*, a Jaina Princess ruled over Bhatkal. According to a tradition still current this queen is said to have ruled over not only Bhatkal but also over the territory extending as far as Bednur (Nagar) in Mysore. *Kadambras* was her minister and *Timmana Naik* of Bhatkal her commander-in-chief whose fame spread far and wide. Lovers of folklore will perchance be amused to hear of the following story.

"In a storm at Bhatkal a thunderbolt struck a plantain leaf and sliding down the leaf formed a ball inside the tree. Next morning a *mahar* named Loma picked the bolt and changed it into a bill-hook which was supposed to have the power of attacking anyone who came to steal grain of which it was in charge. *Timmanna* hearing of its miraculous powers received it as a present from its owner and converted into a sword to fight his battles."

These Jains were overthrown by the chiefs of *Kaladi*, North west of Mysore and situate about 20 miles South of *Banavasi*.

In the year 1,638, the English opened a factory at Bhatkal with a view to carry on trade in pepper and the credit of this is in a large measure shared by Mr. Weddel of Sir William Courten's company. In the early history of the English connection with Bhatkal one unhappy incident occurred which considerably delayed the period of permanent occupation. In 1,670 the chief of the English factory at Bhatkal procured a fine bulldog from the captain of an English trading vessel. One day the factors went out shooting and the bull-dog not realising the sacredness associated with certain quadrupeds attacked and killed a cow near a Hindu temple. This infuriated Brahmins and the mob is killed all the 18 factors. Since this massacre the English men settled there but paid occasional visits to this coast-town only for trading in pepper. But during this period the *Bednur* chief of Mysore seems to have been holding the sway. In 1,707 the Portugese made a fresh treaty with one of the *Bednur* or *Nagar* chiefs and obtained permission from him to start a factory at Bhatkal. For the next hundred years Bhatkal does not figure prominently in history. Either during the disastrous Maratha raids or the exacting depredations of Hyder Ali, the Bhatkal chiefs dwindled into insignificance and with them the commercial importance of Bhatkal was gone. Dr. Buchanan's description of the Bhatkal of 1,801 makes no reference to the commercial greatness. It seems as though the town was divested of that glory. He merely says that it was a large town with about 500 houses standing in a beautiful hill-girt valley. The modern history of Bhatkal upto the year 1,862 needs no detailed description. In that year North Kanara was transferred to the Bombay Presidency for administrative purposes and now it is the head-quarters of a *Mahalkari*, the head of the *peta* in the Taluka of Honavar with a population of about 7,000.

From this brief survey we clearly see that Bhatkal once occupied a prominent position

as a seaport and the causes that have led to its decay need a careful study. Perchance they are the following :—

- (i) Absence of the means of rapid communication and transportation facilities. In these days of locomotion it is not linked with the up country by a railway line.
- (ii) Want of a good harbour to suit the requirements of modern trading vessels and steamships. The steamer communication that is being maintained with Bombay is exceedingly limited in scope and time. The trade is at present carried on by small coasting boats.
- (iii) The natural resources of the surrounding country have remained undeveloped and whatever trade exists there is diverted to other rival and more convenient seaports of Goa, Mangalore or even Bombay which have the decided advantages of direct railway communication with the inland country.
- (iv) The enterprising commercial communities like the *Navayats* of Bhatkal and the agricultural classes are backward in education and their productive capacity is thereby impaired.

We hope that these defects will soon be remedied and Bhatkal will regain its commercial importance.

ANTIQUARIAN REMAINS.

There are 13 temples or *Bastis* as they are called, built during the fifteenth and the sixteenth centuries. All of them bear unmistakable signs of superior workmanship. In front of every temple there is a huge flag-pillar called '*Dhwaja-Stamba*'. Of the Jaina temples '*Jatappa Naikana Chandranatheswara*'s is the largest and the finest. The length of the temple is 112 feet and that of the shrine fifty feet.

Each temple has a history of its own and peculiar architecture. There are many inscriptions in them giving the names of the builders with dates in some cases. Of the Hindu temples the *Nadghar Devastanam* needs a special mention. It is dedicated to the sacred memory of the great Kanarese Saint *Appaya*. Bhatkal is the birth-place of this Saint who was a *Saraswat* Brahmin by birth but a great *Vedantin* by worth. His Kanarese verses though few in number breathe a spirit of genuine piety (*Bhakti*) and give grace to the Kannada Literature. He is undoubtedly the brightest star of the firmament of the *Bhakti* school of thought and was as such the recipient of royal favours from the chiefs of *Nagar Samsthana* of Mysore.

It is also noteworthy that there are four mosques of which the *Jumma* and the *Sultan* are the oldest and the biggest. These administer to the spiritual needs of many Mohamedans living in Bhatkal.

To the south-west of Bhatkal the creek is crossed by a granite bridge with six spans, each span being supported on two granite pillars. It is supposed to be built by the Jain Princess *Channa-Bhaira-Devi*.

There can be no denying the fact that these ancient temples with their inscriptions afford ample materials for archaeological research work and will, in all probability throw a flood of light on the history of Bhatkal and some of the states in and outside the Mysore territory. Histories of the States of Banavasi, Bednur and Sonda that claimed suzerainty over Bhatkal from time to time deserve to be written.

INDUSTRIAL POSSIBILITIES.

Industrial development of Bhatkal and the surrounding country is essential for the success of the Railway and the Harbour Schemes. Under the existing conditions Bhatkal and the adjoining territory do not seem to possess facilities for starting large scale industries all at once. But certainly the small-scale industries bid fair to become

quite successful. Strange as it may seem cottage-industries do possess some inherent vitality to survive the overwhelming competition of modern factories. For the present agricultural industries need modern improved methods. Cultivation of rice and sugarcane is carried on in and around Bhatkal. New implements of agriculture in rice cultivation should be made more popular. Of the sugarcane the black variety called 'Kare-Kabbu' can be more extensively grown. This variety yields the best molasses. The method of squeezing cane juice from the ordinary 'Sugar-cane mills' involves loss. For a pretty long time the Gur is bound to maintain popularity in the Indian household and though the prospects of opening a sugar factory in the near future are not bright, this Gur industry by itself is bound to be remunerative provided improved methods of manufacture and cane cultivation are resorted to.

Of the other industries mention may be made of *iron*. Iron-ore is found in different places in the main range and the spurs of the *Sahyadris* and in the island of Basradurg about a mile off the coast of Honavar. The ore is believed to be compact and dark-brown in colour with a brown streak. There are evidences to show that iron was exported from this port in ancient times.

The Kanara forests yield very valuable teak, blackwood and sandalwood. It is recorded that the ship-building yards of Hyder Ali and the Marathas had their teak and timber supplied from these majestic forests. The minor forest products are *myrobalans* the *hirda*,—the soap-nuts, catechu, honey and wax, the cinnamon, paper and grass. *Khairda*: (*Acacia Catechu*) wood is very hard and durable. *Kath Catechu* is the thickened juice of its boiled wood and this industry is even now carried on.

The fruit growing and the fruit-preservation industry has indeed very bright prospects. Varied kinds of fruits grow and can

grow in abundance here. The following deserve mention:—

- (i) The *Cashew-tree*: *Anacardium Occieentale*.—Though the wood of this tree is of no great value the fruit is very valuable. The pericarp of the nut yields a bitter oil which can be used as caustic. A kind of gum oozes from the trunk and can be used as varnishes. The roasted kernels yield oil. The kernel of its nut and the fleshy stalk are largely used as food and in the preparation of sweets. The apple yields a kind of liquor also.
- (ii) The *Cocoanut palm*:—This is the real 'Kalpatarn' of classic fame. Every part of the tree and the nut is used in some form or other. The nut is freely used as food and yields excellent oil which when subjected to a particular process of purification can give an excellent substitute for *Ghee*. The house of even the poorest labourer testifies to the great utility of this tree and the soil is quite congenial to the growth of this useful plant.
- (iii) The *jack fruit*: (*Artocarpus Integrifolia*). This is grown wild in the forests and the gardens. Its wood is yellow when freshly cut but gradually becomes dark in colour and takes fine polish. Roasted seeds of the fruit are very sweet and largely used even by the rich. In bad times the hill-tribes freely use them. The fruit if preserved may be largely exported. Likewise the mango and the plantain. This is no mere myth and idle fancy. At Honavar the Oriental Kauvery Company is carrying on a lucrative business in 'Mango-pulp'

and other preserved provisions. This is almost at the very doors of Bhatkal.

- (iv) *The Pine-Apple*:—In addition to the fruit the leaves yield a strong fibre,
- (v) *The Tale*:—(*Corypha Umbra Culifera*). This tree grows to a height of 60 to 70 feet, the leaves of which are used for purposes of making umbrellas. The beaten pith yields an edible flour largely used by the poor people. The seeds are a species of vegetable ivory largely bought by the Arabs who visit the coast.
- (vi) *The Undi*:—(*Calophyllum Inophyllum*) trees yield fruits from which oil can be largely extracted.
- (vii) *The Kakkayee*:—(*Cassia Fistula*) is another handsome tree. Its wood is tough and hard and well-suited for furniture. The pulp that fills the pod is used as a purgative. The bark when wounded yields gum also.
- (viii) *The Vouite*:—(*Arto Carpus Lakoocha*)—tree yields a kind of fruit which is used in curries as a healthier substitute for tamarind.
- (ix) *The Myrobalan*.—Grows wild in the forests and is valued in tanning and dyeing.

All these products show the industrial potentialities of Bhatkal and the direction in which cottage industries can be encouraged in and around Bhatkal.

THE NAVAYATS.

No other town in North Kanara has half so large a muslim population as Bhatkal. Most of them are the descendants of Arab and Persian settlers. The *Navayats* are an enterprising set of traders dealing in cloth. They are law abiding and peaceful. This term means 'New comers'. Their ancestors were originally Persians. About the end of the 7th century Hajaj Ibu Yusuf was the

Governor of Irak and treated them very cruelly. Their persecution at the hands of this tyrant drove these people from Kufa to the hospitable shores of Kanara. Their descendants are therefore called '*Navayats*.' They speak the *Konkani* language a dialect of Marathi. The cloth and the timber trade is chiefly in their hands. They are comparatively a rich class of people who invest their earnings in lands which they let to tenants on the *chalgeni* system of cultivation. They are educationally backward, but instinctively clever in trade. Provision will have to be made for their education by founding special *Urdu* Schools. Very few of them go to Bombay for purposes of higher education. It is probable that with better communication facilities they may flock to the Mysore University.

PROPOSED HARBOUR SCHEME.

It is estimated that about a hundred lakhs of rupees will have to be spent by the Mysore Darbar and the following advantages will justify such a heavy expenditure:—

- (i) The trade of Mysore is now handicapped as the merchants have to travel 400 to 600 miles by rail before they can reach a convenient sea-port. The nearest railway terminus is now at Shimoga, in the Mysore State, 111 miles distant. The length of the proposed railway line in the Kanara district will be about 13 miles. Within such a short distance there will be a convenient sea-port.

- (ii) The annual export and import trade by rail on the northern borders of Mysore is about 120,000 tons and over the inconvenient and difficult *Ghat* roads trade between the coast-towns and Mysore passes at present. With the opening of the Harbour this trade is likely to be diverted to Bhatkal.

- (iii) In the malnad districts of Mysore large industries such as smelting the iron ore are being undertaken. This scheme will give a fresh impetus to the industrial enterprises in Mysore and in Kanara also.
- (iv) The congestion at the existing seaports will be considerably lessened. Other seaports being at great distances, this seaport will prosper without adversely affecting the fortunes of other seaports.
- (v) The North Kanara district will be connected by a railway line with the inland country. At present this district cannot boast of even one mile of a railway line. The economic advantages will be reaped by the people of Kanara and Mysore alike. Their productive capacity will increase and ultimately raise their standard of living.

Of course there are other political questions arising out of this scheme which will have to be settled between the Imperial Government and the Mysore Darbar before the scheme is on the verge of realization. But these fall beyond the scope of this paper.

We trust that the proposed railway link and the harbour scheme contemplated by the Mysore Government will soon be an accomplished fact and ultimately strengthen the bonds of union and fellow-feeling between the people of Kanara and Mysore and that they will be for the mutual economic uplift and general prosperity. Bhatkal, then, will have entered upon a career of great commercial interest and regained its past glory.

LIFE ASSURANCE IN INDIA.

By "J. S. C."

THE general tendency in the case of successive issues of returns or reports periodically issued by Government Departments is that they grow in volume from year to year. This tendency is so common that it is refreshing to find an exception to it and to be able to notice that a useful and comprehensive report relating to an important branch of business is actually reduced in bulk with the lapse of years by a wholesome process of condensation and systematization. This remark applies to the 6th issue of the returns from Life Assurance Companies doing business in British India which has been issued by the Government Actuary in India with an introductory note. The volume before us deals with the returns for 1918. The first title page gives the year of issue as 1919 while the 2nd inner title page shows the year of issue to be 1920. As a matter of fact, the publication reached our hands early this year. Considered from the standpoint of speed with which work is done and periodical returns issued in Government Departments, the dilatoriness of which is nothing short of proverbial, the publication may not be regarded as very late, but business men who are accustomed to less leisurely methods would perhaps have appreciated the value of the publication much more if it had seen the light of the day at least six months earlier.

As in the case of previous issues, the volume is replete with information relating to Life Assurance Companies in India which is of the greatest interest and importance to all concerned. The introductory note written by Mr. Meikle is his report as the Government Actuary on the working of the Life Assurance Company's Act 1912 for the year 1918. It is a fascinating document which gives an accurate and complete idea of the

activities during the year of all offices subject to the Indian Life Assurance Companies' Act. It also shows incidentally the valuable work that has been done by the Government Actuary and his department in advising several Insurance Companies and in bringing the working of some of them to sounder and firmer grounds. Besides this report, the volume contains summaries of Revenue Accounts of each Indian Life Office for each of the past six years, a summary of their general balance sheets for 1918, an account of ordinary Life Assurance business done during the year and a statement of their capital and rates of dividend. Then follow summaries of all actuarial valuations of Indian Life Offices received since 1912 and copious extracts from valuation returns received in 1919. All these, of course, relate only to Indian Life Offices, but the Actuary has also given separately in this volume information, as far as available, relating to non-Indian Life Offices doing business in India. There is a summary of Revenue Accounts of these offices for each of the past four years, an account of all valuations relating to them since 1912 and full extracts from the valuation returns of these offices received in 1919. In addition to these particulars relating to Indian and non-Indian Life Offices, the volume gives the Indian Life Assurance Companies' rules as they stood at the end of 1919 and also all amendments to the Indian Life Assurance Companies Act VI of 1912 which have been passed up-to-date. From this brief account of the contents of this volume, it will be seen that hardly anything which is worth knowing about Insurance Companies doing business in India has been left out of this issue of the returns.

We shall now try to give the reader an idea of the variety of topics dealt with by the Actuary in his introductory note. He brings out the fact that there are at present 74 companies subject to the Indian Life Assurance Companies' Act. Of these, 50 are

Indian, 17 British, 2 Canadian, 1 Australian, 1 has a domicile in the Straits Settlements, 1 in the United States of America, and 2 in Shanghai. Of the 50 Indian Companies, 36 are old, that is, were in existence at the date of passing of the Life Act in 1912, and 14 have come into existence since that year. The number of Indian Companies carrying on Life Insurance business in 1912 was large, but many of them have ceased to exist as a result of supervision exercised by Government under the Act. The total sum assured at the end of the year under review was over 25 crores of rupees in the case of Indian Companies. This is satisfactory inasmuch as it is more than one crore in excess of the amount in any previous year, but considering the vast population of India, the figure cannot but be regarded as very small and as one which indicates that, in spite of all that has been done by Indian and non-Indian Companies and by the State the benefits of insurance have as yet touched only the fringe of the Indian population. All those who are interested in the economic welfare of India and of the Indian peoples cannot but regard this state of things as unsatisfactory. The average amount of Life Assurance per head of Indian population is still below one rupee. There is little doubt that, with proper organization and effort, the figure is capable of being increased within a few years at least to Rs. 100.

The following table extracted from Gephart's latest work on Insurance shews the amount of Life Insurance in force per head of population in some of the leading countries at the close of the year 1916 and it clearly indicates how backward India still remains in this important economic field.

Country			Population	Life Insurance in force in American Dollars	Per capita in Dollars
United States	...	...	101,577,000	31,155,603,975	307
Great Britain	...	...	47,000,000	5,870,212,000	125
Germany	...	...	68,000,000	2,350,000,000	34
France	...	...	40,000,000	762,300,000	19
Japan	...	...	55,000,000	270,000,000	5
Russia	...	...	175,000,000	400,000,000	2.50
Canada	...	...	7,000,000	1,402,466.288	235

Turning now to the features of Insurance business in India during 1918, the predominating features were the severe pandemic of influenza and the war. Influenza was responsible for a considerable rise in the total sum falling due under claims by death, the figure amounting to 55 lakhs in 1918 as compared with $34\frac{1}{2}$ lakhs in 1917. One feature of the pandemic was that mortality was greater among Indian females than among males. As the Insurance work of Indian Companies is chiefly confined to males, the effect of influenza on Insurance business was perhaps not quite as severe as might be inferred from the total mortality figure. The war, as Mr. Meikle points out, affected Indian Insurance in three ways, namely, (1) fall in new business, (2) a depreciation of securities and (3) an increased rate of interest obtainable under new investments. The first two effects were unfavourable while the last was a distinct advantage. The effects of the war upon Insurance especially in America and in the United Kingdom has been very exhaustively dealt with in a valuable treatise by Mr. William Gephart, Professor of economics in the Washington University. A similar study with reference to India has yet to be made, but it is quite clear that the fall in new business of Insurance Companies was due more to indirect causes than to direct ones. The casualties of War as Gephart has pointed out, are not confined to those exposed to shot and shell,

bomb and gun. Few countries involved in the present war have been able to avoid entirely inequalities and uncertainties in the supply and distribution of the necessities of life—particularly articles of food. The mortality of both the old and the young, is greatly increased by the strains, psychologic and economic, that war creates. Cares and anxieties are ever drawing upon mental health. Both infectious and degenerative diseases increase rapidly among the civil population in times of War. Industrial and other accidents also grow more numerous. For these reasons, we may add a 4th effect of the war on Indian Insurance in addition to these pointed out by the Government Actuary *viz.*, increased mortality, but this was perhaps not so prominent in India as in the case of countries more directly affected by the War.

Indian Life Assurance Companies have invested the bulk of their funds in Indian Government paper, Municipal and Port Trust debentures, and other Indian gilt-edged securities. In fact, out of a total of $8\frac{1}{2}$ crores, as much as $6\frac{1}{2}$ crores, is invested in this form. The heavy depreciation of these securities brought about by the abnormal economic situation resulting from the War was therefore a matter of considerable significance in Indian Life Assurance finance. But the great compensating factor in this connection was a marked rise in the rate of interest on money. In previous issues of

his report, Mr. Meikle very clearly explained how the unfavourable effects of depreciation of securities were more than counterbalanced by the rise in the rate of interest. His clear exposition of this aspect of the financial position of Indian Life Assurance Companies was as valuable as it was timely, and we certainly think that it did much to allay panic and restore confidence in the position of Indian Life Assurance Companies. That Indian Companies have continued to do due satisfactory business and flourished in spite of the depressing effects of considerable depreciation of the bulk of their investments, is due in a great measure to the Government Actuary's clear and emphatic statement of the case in his successive reports.

One of the most wholesome effects of the working of the Indian Life Act is that Life Assurance Companies are required to have periodical actuarial valuations made of their assets and liabilities. Since the introduction of the Life Act, 37 Indian Companies have submitted the results of their valuations. Eighteen of these valuations disclosed surplus; in all of the remaining 19, the deficit was covered by the paid up capital thus proving solvency, though precluding the payment of either bonus or dividend. In 6 cases, solvency had to be restored by reduction of sums assured or by calling up further capital. In two cases, the degree of insolvency necessitated the winding up of the concerns. Of the valuation returns submitted during the year under review, that of the Oriental is of special importance owing to the relatively large sums involved. By a slight increase of the rate of interest, which is quite safe and perfectly warranted, a dividable surplus of 22 lakhs has been worked out in the latest valuation of this large and flourishing concern.

One feature of the history of Indian Life Assurance enterprise is that those established within the last 25 years are mostly proprietary companies. Of the older ones, a great majority are mutual concerns. Of course

from the point of view of the policy holder, a mutual company, if well managed, is more advantageous; for the whole profits come to the policy holder, and there is no dividend to pay. It is, therefore a wholesome policy to encourage the formation of sound mutual companies. Many of these companies have small funds and are not in a position to deposit in full the amount prescribed in section 4 of the Life Act. The Government have declared that they are prepared to consider applications from Indian mutual companies for permission to pay a smaller deposit. This step must have been taken by Government on the advice of the Government Actuary for which he deserves the thanks of all interested in the promotion of sound Life Assurance business in India.

All well-wishers of Indian Life Assurance business must desire to see the end of those dishonest undertakings, the promoters of which in the name of Life Insurance publish all sorts of alluring schemes purposely intended to deceive those members of the public who from ignorance or from their unsuspecting nature are likely to fall an easy prey to unscrupulous and designing persons. Of the various unsound methods thus practised we may mention that form of business known as Insurance on the dividing principle. Under this system, the sum assured is not fixed but depends each year on a division of a portion of the premium income amongst the policies which have become claims. Usually the premium is the same for all ages at entry and there is no medical examination. Evidently such Insurance schemes cannot be based on any of the Actuarial principles and Mr. Meikle has rightly styled these as the curse of Insurance enterprise in India. Even a child can understand that if Life Insurance business is done without medical examination, all moribund lives will naturally gravitate towards such concerns, and satisfactory business will be impossible. Of these Companies, Mr. Meikle gives a list

of 19 concerns which have gone into liquidation since the passing of the Life Act, and observes that this was rendered necessary in the majority of cases by financial difficulties brought about by Insurance business having been transacted on the dividing principle. Of these Companies he observes:—

"Some of these Companies are greatly responsible for the bad reputation which Indian Life Offices had a few years ago in the minds of those unable to distinguish the good from the bad. The nature of the business transacted, namely, dividing insurance, was apt to lend itself to the practice of fraud on the part of policy holders and agents, and later on by the office as well, when it found the claims increasing and that in order to meet them there was little else than the premiums receivable from new business. To endeavour then to get the policies lapsed by any means, fair or foul, was one of the minor sins of which some of the Companies were guilty."

Of particular interest to Mysore is the following remark of Mr. Meikle relating to the concern which is rightly or wrongly styled as the Mysore Government Security Life and Marriage Assurance Company:—

"The Mysore Government Security Life and Marriage Assurance Company for the past few years has endeavoured to transact insurance business of the dividing type in British India. By keeping its life assurance contracts within the limits prescribed for Provident Societies, it first of all escaped compliance with the Life Act, and by only having canvassers working in British India, and so restricting their powers, it endeavoured to escape compliance with the provisions of the Provident Insurance Societies Act. On being informed that this could not be done, it decided to issue policies which made it subject to the Life Act; but on failing to lodge the initial security deposit, it is only doing business at its Head Office which is in the Indian State of Mysore. The Mysore

Government is however in no way concerned with the Company and by a Notification dated the 23rd December 1914, published in the Mysore Gazette, it announced that the use of the words "Mysore Government" in the name of the company did not mean that the Mysore Government authorised its formation or in any way supervised its business."

Mr. Meikle who is the duly constituted guardian of Insurance business in India is naturally a determined enemy to this vicious form of Insurance business. He leaves no stone unturned to discourage this form. One weapon of crusade against this course of Life Assurance business in India which he has forged during the year under review, is in the form of an addition to the Life Assurance rules. Under these new rules, Companies transacting dividing insurance business, are required to furnish many new statements which will be helpful in securing a better control of this undesirable class of business.

The great boom in Company promotion which has been going on in various parts of India during the last year or two has extended to the domain of Insurance, and several new companies have been established recently with large amounts of subscribed capital with the object of transacting fire, marine, and life insurance business. The New India Assurance Company, and the Bombay City Insurance Company Limited, of Calcutta, have made the deposit necessary before Life Insurance business may be commenced. We welcome these new ventures, the Boards of which contain many names well-known in Indian business circles. We have no doubt that they have a bright future before them. There is room in India for dozens or scores of first class Insurance Companies, and until they are started, the blessings of Insurance will not be accessible to the great masses of this country.

In reviewing this interesting report we have to notice a regrettable deficiency. Neither the total sums assured remaining in

force nor the total amount for which Policies have been issued each year in India by all companies can be stated, as unfortunately particulars of this nature are not required to be submitted by the British Companies and by some other Companies which do business both in the United Kingdom and in India. It seems to us necessary to remove this deficiency by requiring all companies doing business in India to submit full statistics relating to their Indian business. Otherwise in Indian Life Assurance statistics, there will be a gap which may make it exceedingly difficult to use them for purposes of economic study or discussion.

We will conclude this brief review with a few remarks on the statistical summaries included in the volume. The form in which the Revenue Accounts of Indian Companies is presented is an excellent one which shows at a glance not only the particulars of each Company's accounts as compared with the corresponding particulars of other companies for the same year but with the returns of the same Company in previous. The Revenue Accounts show that the Oriental of Bombay is by far the largest Indian concern of its kind, its Life Assurance Fund at the end of 1918 being well over 4½ crores. The Empire of India with its 1.11 crores follows as a distant second. There is no other company in India whose funds exceed the crore limit, the funds of the third, the Hindustan Co-operative Insurance Society being below 35 lakhs and those of the Bharat under one-fourth of a crore.

The summary of the balance sheets brings out certain interesting facts among which the investments in War Loan by the several Insurance Companies may be mentioned. In this respect, the Empire of India comes first with its War Loan Investment of over 40 lakhs, the Oriental coming next with a little over 23 lakhs. The Statement of business effected during 1918 is also interesting. The Oriental, as might be expected, leads by a long way, the new total sums assured

in this Company during 1918 being over 119 lakhs as against about 34½ lakhs of the Empire of India.

The Statement of dividends paid during the last twenty years is a useful one. The Oriental has paid a steady and increasing dividend during the last twenty years beginning with 4 per cent in 1900 and ending with a steady 30 from 1914 onwards. The Empire of India began with a dividend of 4 per cent in 1900 which rose to 42 per cent in 1914-15-16, but has fallen to 30 per cent since 1917. In this connection, it may be mentioned that the capital of Life Assurance Companies is very small compared with the volume of business transacted, the paid-up capital of the Oriental being only about 1½ lakhs, and that of the Empire of India, being only about half a lakh. So the payment of even a high rate of dividend on the small capital does not appreciably affect the interest of policyholders.

A firm of importers of German goods, *via* Holland displayed at their offices in the Strand last evening a range of suiting sent from Germany on 'appro,' which may be sold in this country, made up and ready to wear, at from half-a-crown to 10s. 6d. per suit. These suits, 'ready-made' are manufactured of paper and are cut to English style. One thousand of them can be forwarded f. o. b. for £120 and these are "of the very best class of paper texture." Other samples permit English retailers to make any thing 200 to 300 per cent profit. Certain samples of the completed suits were permitted to pass the Customs at the declared value of 10d. per article. The firm of agents dealing with these German goods declare that under the system of buying the German paper suitings at the present rate of exchange it would be possible or an Englishman to be 'comfortably dressed' in a new suit once a week and the entire cost would be less over a period of 2 months than for the single West-end suit, cut and style thrown in.

THE BASSIA TREE AND ITS PRODUCTS.*

OF the three species of *Bassia* commonly met with in India the principal one is *B. latifolia* (Roxb.), indigenous to the forests of Central India. It is known by the vernacular names of "mowra," "mahua," "mohoura" and "mohwa." In South India and Ceylon its place is taken by *B. longifolia*, which is put to the same economic uses. The third tree is *B. butyracea* of the sub-Himalayan tract, known as the Indian butter-tree.

The seeds of these trees yield an important commercial product in the form of the valuable edible fat known as Illipe butter, largely employed by the natives as a food-stuff. Before the war the export of seeds to Europe was considerable, being mainly utilised in Germany and Belgium for the manufacture of margarine, soap, candles, etc. *Bassia* kernels and fat form the subject of articles previously published in the *Bulletin* (1911, 9, 228; 1915, 13, 342). The trade in the kernels, and the nature and uses of the fat and the residual cake and meal are also dealt with in the Imperial Institute Monograph on *Oil Seeds and Feeding Cakes* (London: John Murray, 1915).

Amongst the native population of India the chief importance of the mowra tree lies in the flowers, which are rich in sugar and highly valued as a foodstuff and as the source of a spirituous liquor. Some conception of the value put upon the flowers for these purposes by the natives is gained from the estimate made thirty-three years ago, that in the Central Provinces over 1,000,000 people, use the corollas of the mowra as a regular article of food, each person consuming about 80lb. per annum. In the Bombay Presidency they are also used for domestic consumption on a large scale and throughout

India are looked upon as a valuable reserve in famine years. The flowers of *B. butyracea* are not eaten, but a syrup prepared from them is boiled down, yielding a sugar about equal in quality to date sugar.

The mowra tree sheds its leaves in February and the flowers appear in March and April, at which time the ground beneath the trees is carefully cleared.

The flowers have a thick, juicy globe-shaped corolla of a pale cream colour, enclosed at the base in a velvety chocolate-coloured calyx. The corollas fall in the early hours of the morning and are collected by the women and children. They are spread out to dry on mats in the sun, when they wither to half their weight and develop a brownish-red colour. In some cases the flowers are collected before they drop, and in many places it is the practice to remove only the corollas, leaving the pistil to ripen to a fruit. A tree will yield 200-300 lb. of flowers in a year.

When fresh, the flowers are extremely sweet with a peculiar pungent flavour and a characteristic odour. When dry, the peculiar pungent flavour is less perceptible, particularly if the stamens are removed, and the flavour then resembles that of figs. The flowers are eaten either fresh or dried, and cooked in many different ways, with sal seeds, rice, shredded coconut, or flour.

The greater portion of the crop of flowers is used for the preparation by fermentation of daru or mohwa spirit. For this purpose jars holding from 10 to 20 gallons are charged with 13 to 20 seers of dried flowers, spent-wash and water. In some cases molasses is added and may replace as much as half the quantity of the flowers. The mixture is left to ferment, which requires from 3 to 7 days according to temperature, and the liquor is then distilled from crude earthen pots. The distillate so produced ranges from 60° to 90° under proof. A second distillation is sometimes made, raising the strength to 25° under proof. Native spirit

*With acknowledgments to the *Bulletin of the Imperial Institute*, London.

prepared in the way described has an offensive butyraceous odour and is rich in fusel oil, one sample examined by Elsworthy containing 3 per cent of fusel oil (*Journ. Soc. Chem. Indust.*, 1887, 6, 23). On rectification this unpleasant odour is largely removed. By the native methods 1 maund ($82\frac{2}{7}$ lbs.) of dried flowers yields about 2.12 gallons of proof spirit, but in England it was found that over 6 gallons of proof spirit could be obtained from 1 cwt. of the flowers which have been kept for some months yield a better spirit than when quite fresh, but if over twelve months old they are not so well suited for distillation.

About 1888 there was a considerable export of the flowers to Marseilles for use in making a cheap brandy; but the French Government, in order to protect the home grape industry, prohibited the import.

The composition of the flowers has been investigated at different times and the results vary considerably, particularly in respect of the quantity and nature of the sugar present. The total amount of sugar recorded in the flowers of *B. latifolia* varies from 40 to 70 per cent. The quantity of cane sugar recorded from 3 to 17 per cent, and that of invert sugar from 40 to 53 per cent, whilst one author has stated that the sugar is entirely invert sugar. The dried flowers of *B. longifolia* have been stated to contain about 70 per cent of sugar. Only a small quantity of protein is present—the maximum amount recorded in either species being 7.25 per cent.

Thirty years ago attention was directed to the richness of *Bassia* flowers in sugar and the possibility of their being used in India as a source of sugar for export; but when it was established that except for a very slight proportion the sugar was uncrystallisable and therefore of little value except perhaps as a brewing sugar the interest from this point of view died down. To-day, with enormous European products of beet sugar to compete with, the probability of *Bassia* flowers being

called upon to supply any part of the world's sugar requirements is more remote than ever.

During the war interest was centred in the production of acetone from *Bassia* flowers in India to supply the local demand in connection with the manufacture of munitions. The acetone was produced by the now well-known special fermentation process, and it has been alleged that the yield from the flowers of *Bassia latifolia* was one-tenth of their weight or nearly ten times as much as is obtainable by distilling wood. The demand for acetone in India in peace times would not be large enough to justify the available supplies of flowers being entirely devoted to the manufacture of that product, but there remains the possibility of their being used for the manufacture of industrial alcohol. Derived from a forest tree, the other products of which are also of considerable economic value, they appear to represent an exceptionally cheap source. The yield of alcohol from the flowers is high compared with that from potatoes and other materials commonly used. It has been stated that about 90 gallons of 95 per cent alcohol is obtainable from 1 ton of dried flowers.

In view of the extended use that is now being made of alcohol for power purposes it seems likely that the most profitable way of utilising the flowers would be as a source of a mixed motor spirit of the "natalite" type for local use in India. That motor spirit can be produced on a manufacturing scale in India from *Bassia* flowers has already been demonstrated, and it is stated that running trials with the spirit proved satisfactory.

"Natalite" is mainly a mixture of alcohol and ether and its manufacture involves not only the production of alcohol from the flowers but of ether from the alcohol. It would be necessary to set up an extensive plant for this purpose and whether such a procedure would be payable depends largely on the cost of collecting the raw material, which in turn is dependent to a great extent on the quantity available.

According to information supplied to the Inter-Departmental Committee on Alcohol and Motor-Fuel by the Director of Commerce and Industries to His Exalted Highness the Nizam of Hyderabad, the total cost of collecting and drying the flowers and delivering them to a factory in the zone of growth amounts to £1.10s. per ton. This estimate, however, refers only to Hyderabad, where the conditions are particularly favourable owing to large numbers of the tree occurring together. In regions where the tree is more scattered the cost delivered to a factory would naturally be higher, and in such cases it would probably not pay to utilise the flowers on a commercial scale, unless the tree was cultivated for the purpose.

It has been estimated that in the Hyderabad State alone there are already sufficient *Bassia* trees for the production of 700,000 gallons of proof spirit per annum, in addition to that necessary for the local liquor requirements.

The mowra tree appears to be decreasing in some districts. This is due partly to the fact that the dead leaves and grass under the trees are cleared away and burnt, in order to facilitate the collection of the flowers, with the result that natural regeneration is hindered. It is important therefore that attempts should be made to encourage the cultivation of the tree, for in addition to the question of the production of alcohol from the flowers, and the value of the seed as a source of oil, the flowers form a valuable food for the natives, particularly in famine years. The tree is well adapted to withstand drought, and is specially suited for planting on dry and waste lands, where little else, will grow. G. M. Ryan (*Indian Forester*, 1918, 44, 302) suggests that if the trees are planted about fifteen to twenty per acre, the jungle-wood growing between would afford a supply for fuel. The tree takes about twenty years to produce flowers and seeds in large quantity, but during this period the land need not be entirely unproductive if interplanting were adopted at first. Experiments conducted in Assam during the past ten years have shown that, owing to the long tap root, the *Bassia* seedlings do not transplant well, and therefore the seeds should be planted *in situ*.

WAR THRIFT—A REVIEW.

BY A. V. RAMANATHAN, B.A.

"Annual income, twenty pounds, annual expenditure nineteen, nineteen, six; result happiness, Annual income, twenty pounds, annual expenditure, twenty pounds, nought and six; result misery."

In the essay before us, Professor Carver explains the application of the above principle on National Economy during War. This study forms the tenth of a series of "Preliminary Economic Studies of the War" prepared under the direction of the Carnegie Endowment for International Peace. As the general Editor of the series, Professor Kinley points out that "this study of 'War Thrift' was published too late to be of use to the American public in war time. But it contains many lessons which we as a people, have to learn, even in time of peace. Professor Carver's treatment of the subject is both theoretical and practical and should be useful in helping us to order our public and private affairs so as to secure greater economy."

The virtues of 'Savings' were so greatly emphasised, if not extolled, by the earlier Orthodox Economists that in the latter part of the nineteenth century a school of thought gained ground, which transferred the emphasis from wealth to happiness, from production to consumption, from matter to man. Said Sismondi—"man lives in society to secure his happiness, and not to produce cotton and buttons at the lowest price." But as is the law with all revolutions, whether of thought or of action, the Humanists swung an extreme view and their theories led to conclusions which were eminently ideal but equally unpractical. It is pleasing to find

"War Thrift" by Thomas Nixon Carver, Professor of Political Economy, Harvard University. No. 10 in the Preliminary Economic Studies of the War issued by the Carnegie Endowment for International Peace.—Oxford University Press, New York.

that in his essay, Professor Carver has taken a comprehensive and practical line and while laying under contribution the best impulses and ideas of the Humanist School, is yet content with an analysis of presentday conditions taking man as we find him rather than the perfect being we would all like him to be.

Professor Carver rightly starts by emphasizing that "thrift does not mean the hoarding of money." He proceeds to tell us "thrift, no less than extravagance, consists in using money—that is, in spending it." "To spend money for immediate and temporary gratification is extravagance. To spend it for things which add to one's power, *mental, physical moral or economic*, is thrift. To spend it for tools of production wherewith one may increase his productive power is thrift." "Money is spent as truly in the one case as in the other. It stimulates business as *effectively* in the one case as in the other." *En passant*, we may remark that Professor Carver has unwittingly tripped here. We agree that the immediate consequence of the "spending" in both cases is to create demand for the goods or services on which money is spent. But we do not see how the "effectiveness" can be the same in both cases. In the one case, the stimulus is of temporary duration. In the other, it is more durable, if not permanent. As Professor Carver himself says "when money is spent extravagantly, it adds nothing to the productive power, either of the individual or of the nation. To spend it thriftily is to add to the productive power of both the individual and the nation."

At this stage, Professor Carver anticipates the objection of the Humanists that thrift all round will result in over-production and says: "One might equally argue that if our moralists and preachers of righteousness continue to extol the virtue of industry and decry sloth and idleness, the people might make the mistake of producing too much. Thrift and industry have very much the same effect in the long run on the total volume of

production. Thrift is the means by which *the community equips itself with durable goods* and with the instruments of production. The community that spends all its income for immediate gratification can never add to its industrial equipment. The community that spends a part of its income not for immediate gratification, but for the distant future, for things which add nothing to its immediate satisfaction but which increase its productive equipment, is a community which grows in productive power from year to year and from generation to generation."

Now how does the action of the individual influence the general industrial state of the community? To this, Professor Carver answers.—"The energy of a community or a nation is either directed by authority or by persuasion. By persuasion is meant not merely verbal argument or wheedling; it includes the lure of personal advantage, the desire of pleasing some one whose good will is esteemed and a multitude of other things—not the least important among them being the offer of a reward, pecuniary or otherwise. To offer a price for a commodity or a service is to attempt to persuade some one to produce the commodity or to render the service." He next proceeds to emphasize that "in a free industrial society, the way in which the people spend their money determines the direction in which the productive energy of the community is utilized." If therefore there is a general disposition towards thrift, *i.e.*, spending so as to increase productive power, and if luxury for immediate consumption is not in keen demand, "there will be an abundance of tools for the production of all the things which would supply the moderate needs of the community. With the needs thus supplied, the people could either work short hours or in a leisurely manner, or they could use their abundant energy in producing things of durable or permanent value such as buildings of architectural beauty, roads, irrigation projects, the drainage of swamps and various other enterprises

which would provide for posterity, enlarge the possibility of life in the national territory, and greatly expand the national power and greatness." Athens and medieval Europe are examples that Professor Carver cites in this respect. And we would add, Ancient and medieval India as well. Thus does Professor Carver succeed in harmonising the theories of the Orthodox School regarding thrift with the ideals of the Humanist School as regards the purpose of human activity. Thrift enables production to be speeded up, increases alike the amount of energy and leisure available after providing for the material wants and moderate material luxuries of human existence, and thereby enables each age to devote its surplus energy and time to the creation of objects or to speculative knowledge and thus bequeath to posterity the flights of idealism reached by it.

As already stated the chief interest of the book to us is in its analysis of thrift under peace conditions and we need not therefore follow Professor Carver in his application of the reasoning to war time needs. Suffice it to say with him—"to invest is to spend money for things of *vital* and permanent value rather than for things of *trivial* or temporary value" and in time of war, nothing is more vital than the successful prosecution of the war to victory.

Having admitted that luxuries have a definite place in the economy of a nation, Professor Carver next proceeds to determine its definite place and to judge of its effect upon national prosperity. Luxuries, he defines, as including "everything not required for health, strength and efficiency of the people and not demanded as decencies by the general consensus of opinion of the whole nation." The demand for luxuries is generally recognised as having a stimulating effect upon industry. John Stuart Mill went to the length of saying that the work of civilizing the savage consists in part in inspiring him with new wants and desires as a motive to steady and regular bodily and

mental exercise. Sir M. Visvesvaraya was also never tired of impressing on the public mind the need for dis-"content" with existing economic conditions and 'standard of comfort' if there is to be economic improvement. How is 'luxury' then preferable to 'leisure'? Here is Professor Carver's answer: "The individual desiring leisure rather than luxuries will naturally, if he has any surplus time, devote it to rest rather than to earning the means of purchasing goods. On the other hand, an individual having an intense desire for luxuries will with equal certainty, choose to use his surplus time in earning the means of purchasing the material luxuries, and will therefore be more active and energetic. There is not much doubt that a nation made up of men of strenuous natures who delight in action and care intensely for the products of industry will be a stronger nation than one made up of people whose chief desire is for rest and leisure." Here is the case against India in a nutshell. Is it too much to hope that it will go straight to the hearts of all Indians and stir them up to greater activity in the material economic field?

Even luxuries "serve as a storehouse of labour which, in the exigencies of war and other calamities, may be turned to public service." Of course, a surplus of energy exists in a nation delighting in leisure also. But it is far too latent and untrained; nor can it command the necessary *material equipment* in time of need. This last consideration, that of material equipment, leads us on to the case of a nation which elects, and educates itself to using its surplus energy not in luxuries of transitory nature or immediate consumption but in the production of capital *i.e.*, of durable sources of satisfaction. Such a nation, it will be noticed, will have the lead even over the nation delighting in luxuries, for it will not only have the surplus energy but a vastly better equipment as well, and what is more it will not be inconvenienced by the diversion of

its surplus energy to war work; nor will it be reluctant to do it, as the luxurious would and did early in the latter War. "It is no accident, therefore, that the nations which take their surplus in the form of frequent holidays, of graceful consumption, and elegant leisure, have long since fallen behind in the progress of civilization, while those nations who have preserved a kind of emotional interest in the austere and productive life, whose ideals of life have centred in the future rather than in the present (much worse if it centred in the past!) have become the great nations in every modern sense."

We believe we have said enough to show the high suggestiveness of the book and its value for us in the solution of present-day Indian and Mysore problems. India has probably the most frugal population on earth; but they are the most thriftless as well. As Professor Carver remarks, "To hoard money is one of the most thriftless things one can do with it. To have used it for the adornment of his body would scarcely have been more frivolous, thriftless or selfish." In India, most of us till recently, and many of us even now, take all precautions against a loophole for thrift by both hoarding money and using it as ornament. And this we do, while "the capital in the hands of country traders has proved insufficient to finance the ordinary movements of the crops, and the ryot is driven to pay high rates of interest for the ready money which he needs to buy seed and to meet the expenses of cultivation," and when small and middle-sized industries in the mofussil are famishing for lack of capital.

Indian industries are thirsting for capital. A huge programme of industrial development and equipment is necessary before India can cover lost ground. Mysore is eager to take her share in the task. A programme of capital works has been sanctioned and inaugurated. Capital is a *sine qua non* for these enterprises. The Mysore 1920—40 loan of one crore is being raised to finance this programme.

As the Dewan Sahib said in his address to the Representative Assembly, in May last, the loan is earmarked for the following works :—

Railways and Tramways ...	25'0 lakhs.
Krishnaraja Sagar ...	16'2 „
Electric Works ...	20'0 „
Industrial Works ...	31'0 „
Other Minor Works ...	1'3 „
Industrial Investment ...	3'0 „
<hr/>	
Total ...	96'5 lakhs
	— of
	rupees.

Subscription to this loan does not involve either loss of intermediate income or of ultimate capital. The loan is issued at a discount of one per cent; that is, only 99 rupees has to be paid for a one hundred rupee bond, and an annual interest of Rs. 6-4-0 per cent is payable every half year. The capital itself is guaranteed on the assets and revenues of the Government and the resources of the State. Of realisable assets, Mysore had on the 1st July 1920, Rupees 3,05,26,000 and the *outside* calls thereon amounted only to Rupees 2,70,00,000 leaving out on both sides the Mysore Railway Sterling debentures which are separately provided for. In addition, the value of the capital works now yielding revenue, amounted to over eight crores of Rupees, all of which are unencumbered till now. The other material wealth of Mysore was valued at two hundred crores by Sir M. Visvesvaraya in 1918. Security is thus ample and the return liberal. The Mysore public have now a unique opportunity of giving practical proof of having benefited by the enlightened awakening of the last eight years.

CALCUTTA UNIVERSITY COMMISSION.

[Not long ago we published in this *Journal* a summary of the recommendations of the Calcutta University Commission. The Government of India have issued their Resolution on these recommendations. We give below the main portions of this Resolution.—*Editor, M. E. J.*]

The brief summary of certain portions of the Report which has been made above is not to be taken as fully representing the present condition of affairs in Bengal, still less in India as a whole. The extraction of passages or opinions from a report of this nature is apt to be slightly misleading. The Government of India desire it to be understood that, while they agree with the criticism passed by the Commission, they are also fully in accord with that body in acknowledging the great services which the establishment of western education and the activities of the University of Calcutta have performed in the past. The affiliating and the examining university is now regarded by many high authorities as radically faulty. But it is difficult to see what other organization could in the middle of the last century have been set up in Bengal or elsewhere in India for the expansion and co-ordination of higher learning. The legislation of 1904 recognized teaching as a proper function of the Indian universities. But it was difficult to devise a workable scheme for the performance of this function in face of the wide area affected, the competing claims of colleges and the necessity of safeguarding the interests of various institutions. The isolated and self-contained character of the colleges rendered impossible the exercise by the University of that control over teaching and the appointment of teachers which is requisite and forced the central body to use the influence through the promulgation of

rigid rules and syllabuses which were calculated to stifle individual and original effort. These difficulties were enhanced as the number of colleges grew and in recent years have rapidly increased owing to the large number of students who have sought university instruction. Furthermore, the growing demand has called into existence a number of institutions markedly unequal in the matter of staffing, in the nature of instruction afforded, in equipment and in the supervision which they can exercise over students. It is little wonder that an institution which for many years usefully served the requirements of higher education in Bengal has under the rapid changes of recent times found difficulty in coping adequately with functions which have become unwieldy and in fulfilling demands made upon it by a new and swiftly changing order of things.

Again the preceding section of this resolution has dealt only with certain of the explorations made by the Commission, because, a full comprehension of these points is necessary for the appreciation of the legislative changes which, in the opinion of the Commission, it is necessary to make in order that the University of Calcutta may more effectively fulfil its functions. The report ranges over many subjects regarding which nothing has here been said. The educational needs of Musalmans, of Europeans and Anglo-Indians, and of the Backward Classes; the medium of instructions; oriental studies; legal, medical, engineering and mining, agricultural and technological instruction, the training of teachers and other cognate matters are dealt with in the report. The object of the succeeding paragraph is to concentrate attention upon those particular points of criticism which have direct bearing upon the University of Calcutta and with which any legislation affecting that institution will have to deal.

MAIN LESSONS OF THE REPORT.

The main lessons taught by this report, the lessons on which the Government of India

consider that the earliest attention may usefully be concentrated, are the following :—

- (i) High schools lack proper supervision, and intent on preparing their pupils for the matriculation examination, fail to give that breadth of training which the developments of the country and new avenues of employment demand.
- (ii) The matriculation examination in Bengal provides an insufficient test of fitness to pursue university courses and by its rigidity and narrow scope reacts unwholesomely upon the instruction and the activities of the schools.
- (iii) The intermediate section of university education attempts to deal by university methods with large bodies of ill-prepared students and should be frankly recognized as a part of school education, relegated to separate institutions, apart from the university organization, and placed under a body duly co-related with the department of public instruction.
- (iv) The system of affiliated colleges, though defective according to modern requirements and modern ideals, will long remain a necessary part of university organization in Bengal. But its inconveniences may be mitigated by the establishment of a strong central teaching body, the incorporation (as occasion arises) of unitary universities, such as that proposed for Dacca, a modification of the administrative machinery which will admit of fuller representation of local interests, and supervision of different classes of institutions by several appropriately constituted authorities.

- (v) The administrative arrangements of the University of Calcutta call for alteration, notably in the direction of creating an academic body, appointing a whole-time Vice-Chancellor and transferring the interests of the University to the care of the Government of Bengal.

These points represent but a small part of the result of the Commission's investigations. But they are the matters which the Government of India regard themselves, the local Governments and the universities most urgently called upon to consider.

The Government of India, therefore, commend these matters to the consideration of local Governments and universities. They commend also the many suggestions which the Commission has made on the more strictly academic side of high school and university education. They leave it to the local Governments to take such action as they think fit regarding the most important recommendation of the Commission, namely the separation of intermediate from collegiate education and the placing of it, together with secondary education under some suitably constituted body on the lines of the Board of Secondary and Intermediate Education proposed in the report—so constituted as to represent various interests and so related to the department of public instruction as to obviate any undue abrogation of the responsibility of Government for the adequacy of school training. They leave also to the consideration of local Governments such administrative questions as the changes suggested in the general organization of teaching and inspecting staffs, the future control of Government schools and colleges, etc. But it is necessary that the Government of India take early action regarding those recommendations which directly affect the University of Calcutta, since University forms the immediate subject of the Commission's investigations and (until the measure, which the

Government of India now propose, passes into law) remains the special care of the Governor-General in Council and of the Governor-General as Chancellor. Here also the administrative matters, including the future organization of secondary and intermediate education in separation from the University will appropriately be decided by the Government of Bengal. The concern of the Government of India is the passage of the legislative measures requisite for giving effect to the main recommendations of the Commission regarding the reconstitution of the University of Calcutta and the incorporation of the University of Dacca. The second of these proposals is intended to set up a new type of University in Bengal which may possibly be the precursor of other universities of a similar nature in that presidency and elsewhere and to relieve the University of Calcutta of some small portion of the heavy burden which it now sustains. The legislation to that end has already been introduced in the Imperial Legislative Council. As regards the University of Calcutta it is the intention of the Government of India to publish and place before the Imperial Legislative Council a measure based on the lines indicated in the remaining portion of this resolution. The Government of India propose to publish the text of the Bill as soon as possible. But they have decided to precede it by the present resolution in order that no time may be lost in acquainting the public with the main features of the measure contemplated. The proposals set forth in the following section, which will form the basis of the Bill, have been discussed with the Government of Bengal, who are in accord with the Government of India regarding the suitability of the action contemplated.

CRITICISMS OF THE REPORT.

Such, generally expressed and exclusive of many matters which, though less essential for the carrying out of the scheme, are nevertheless of considerable importance, are the proposals of the Commission regarding

the University of Calcutta. The Government of India accept them as probably embodying the most feasible scheme which is compatible with existing conditions and which at the same time gives promise of healthy development in the future. The legislative measure embodying the Commission's proposals, which it is intended to place before the Imperial Legislative Council, will, it is hoped, not depart in essential respect from the provisions set forth in the Report and only summarized in the broadest lines in this resolution. The Government of India, however, observe that two members of the Commission were not in entire agreement regarding certain aspects of the proposals and that criticisms have been put forward in other quarters—some to the effect that the changes suggested are too radical, others to the effect that still more drastic alterations are required. It is, therefore, to be understood that while the forthcoming legislation will embody the essential outlines of the Commission's scheme, there may be room for differences in detail, dictated by administrative considerations or by public criticism.

In particular, the Government of India consider that the treatment proposed for temporarily affiliated colleges may, in practice, lead to difficulty. If the new organization in Calcutta is really to assume the functions of an efficient teaching organization it will be hazardous to permit the continued existence in Calcutta of a class of institutions insufficiently equipped for participation in the teaching university and calculated by their proximity to depress the standards which such a university should maintain. If on full consideration these apprehensions are found to be well based, it will be necessary to devise means for dealing with such colleges in a more expeditious manner than that contemplated by the Commission and it will probably prove most satisfactory if the Executive Commission is instructed at an early date to class these colleges which hold out no

prospect of fulfilling the conditions of constituent colleges as intermediate institutions which would be definitely separated from the university and placed under the board of secondary and intermediate education.

The case is different with the *mufassil* colleges, which serve a useful purpose by providing higher education near to the homes of many students and by preventing those students from further augmenting the already overcrowded state of Calcutta colleges. It is, therefore, suggested that provision should be made for renewing the affiliation on present lines of those *mufassil* colleges, which cannot immediately be classed either as university or as intermediate colleges.

The Commission apparently contemplated that the separation of intermediate from college classes, which forms the main pivot of their proposals, should not take immediate effect in temporarily affiliated and *mufassil* colleges. The case of the former kind of college has already been treated. But, as regards *mufassil* colleges, while the degree courses continue to be allowed for some time even in those institutions which cannot definitely be classed as university colleges, it appears to the Government of India to be important that they should rid themselves from the commencement of the presence of intermediate students—a condition which should apply to all institutions connected with university save women's colleges.

SUGGESTED DEVIATIONS FROM PROPOSALS.

The following points indicate the manner in which the questions mentioned in the preceding paragraph may, in the opinion of the Government of India, suitably be treated. They also indicate certain other deviations from the detailed proposals of the Commission which it may be found desirable to be included in the Bill.

- (i) *Powers of the Chancellor.*—The chancellor may in some cases be substituted for the Government

of Bengal as a sanctioning authority; e.g., as the sanctioning authority as regards Statutes. This change as in the Dacca Bill, would be made in order to emphasize the personal relation of the Chancellor with the University.

The Chancellor may also be given, as in the Dacca Bill, the power of suspension of operation of an Ordinance which he deems likely to be cancelled by the Court or disallowed by himself.

- (ii) *The court.*—The number of members of the Court may be slightly changed by specifying the number of members to be nominated by the Chancellor, by allowing the Chief Commissioner of Assam to be appointed members to represent Assam, by including the chairmen of the Board of Secondary and Intermediate Education and the Muslim Advisory Committee, by reducing the number of Vice-Chancellors of other universities and the number of representatives assigned to associations contributing not less than Rs. 5,000, by omitting the representatives of faculties, of governing bodies of colleges and temporarily (until those institutions take fuller shape) of intermediate colleges and secondary schools, and by confining the membership of donors of Rs. 10,000 to five years. These changes would slightly reduce the size of the Court, prevent overlapping in its membership and add a few desirable elements.

- (iii) *The Executive Council.*—The constitution of the Executive Council may be slightly modified, mainly by the substitution of two Deans of Faculties elected by

the Academic Council and two appointed teachers elected by the same body for the three university teachers who, the Commission proposed, should be elected by the Academic Council.

Power may be given to the Executive Council in all financial matters within the limits of the budget, also supervisory control subject to certain safeguards over the framing, etc., new regulations.

- (iv) *The Academic Council.*—The constitution of the Academic Council may be slightly modified mainly by some reduction in the representation of recognized teachers and the Board of Secondary and Intermediate Education and by leaving indefinite the number of representatives of vocational Faculties.

It is suggested that it may be empowered to constitute sub-committees or, if it thinks fit, an Executive Committee, and to appoint external as well as internal examiners subject perhaps to the retention by the Executive Council of the duty of appointing committees, in consultation with the Academic Council, to moderate examination questions and to report result to the Executive Council.

- (v) *Faculties.*—It is suggested that the membership of these bodies be limited. The Deans should probably be the chairmen.

- (vi) *Temporarily Affiliated Colleges.*—These should be mentioned only in the transitory provisions and it should be the duty of the Executive Commission, before its dissolution to class them either as incorporated or constituent colleges, or as intermediate colleges.

- (vii) *Conditions of Recognition for Temporarily Affiliated and Mu-*

fassil Colleges.—The prescription of conditions may be left to the Executive Commission. But, save in the case of women's colleges, the continuance of intermediate and of degree classes in one and the same institution should not be permitted after the date on which the Act comes into force.

- (viii) *Appointments.*—The appointment of the teaching staff will be the work partly of selection committees of the university sitting in India and partly that of some organization which will be able to arrange for recruiting in the United Kingdom. Two departures from the Commission's report are proposed :—

- (a) The nominations of the selection committees may be sent direct to the Executive Council and not confidentially through the Academic Council since to do so would be to court undesirable discussion and possibly personal intrigue.
- (b) Cases may arise where as election committee in England will not prove either the best or a necessary instrument for nomination, and where the Secretary of State could select without the aid of a Committee. But this course should not be adopted unless the Chancellor reports to the Secretary of State that exceptional circumstances exist justifying it.

- (ix) *Admission.*—Provision should be made as in the Dacca Bill requiring the approval of the Government of India to the acceptance of other examinations as equivalent to the intermediate and degree examinations or to any

other tests which are to be recognized as the minimum qualification admitting to the courses of the university. This seems to be desirable because such examinations will not be confined to Bengal and because the whole question of admission to University must be dealt with by some central authority if confusion and undue competition are to be avoided. Moreover, lack of uniformity, in these matters is liable to prove embarrassing to Indian students proceeding to England.

- (x) *Territorial jurisdiction.*—It is desirable that the Bill should contain a clause generally similar to section 27 of the Indian Universities Act, VIII of 1904. The limits of the teaching organization should also be laid down; and it is proposed to express them as co-terminus with municipal Calcutta as defined in the Calcutta Municipal Act III of 1899.
- (xi) *Extinction of privileges.*—It seems necessary to provide for the extinction of all privileges conferred under the existing Act with a view to their re-conferment at the discretion of the Executive Commission.
- (xii) *The Executive Commission.*—The Executive Commission will be limited to seven members so as to become a more workable body; and the representation of the Government of Bengal will be fixed at two members.

Certain other deviations are suggested. These are generally of minor importance. They refer mainly to the procedure following an inquiry by the visitor or appeals from aggrieved communities, the position of the Treasurer, the provision for certain teachers

to appear as private candidates, the inclusion of a new body called the Board of Co-ordination to make the most effective use of the teaching facilities and accommodation, provision for permitting a women's college to attain the rank of a constituent college. Some other unimportant changes will probably figure in the Bill, and it may be found desirable to express in the Bill itself the proportion and method of Mahomedan representation in the large bodies, viz, the Court, the Executive Council and the Academic Council.

The Government of India propose to place before the imperial legislative council a Bill embodying the main proposals of the commission with the deviations indicated above. They do not at the present stage commit themselves as regards these deviations or the detailed provisions of the measure. They trust the Senate of the University of Calcutta and such other bodies as are closely concerned with the questions at issue will forward their opinions at a very early stage through His Excellency the Rector or the Government of Bengal as the case may be, in such time as to permit of the publication of the bill by the end of April, 1920.

The Government of India are well aware that the proposals of the Commission may excite apprehensions in the minds of some. Vested interests may suspect that they are threatened, the sentiments which have grown round the University as it exists may feel themselves touched. But the scheme which the Commission has framed shows due consideration in all these matters. It is necessary to recognise the task of public instruction in all its branches as an important trust laid upon Government and upon the nation, in which while violence to personal interest should, where possible, be avoided, the greatest good of the majority must prevail. The traditions and the affections which cling round a time honoured institution will only be strengthened by its development; for progress with the time must now, more than

ever, be the watchword in education and the Commission has amply shown that the system in Bengal calls for readjustment to suit changing circumstances. It is not pretended that the realization of the Commission's proposals will be an easy matter. Funds will be required, high administrative ability will have to be called into play, apprehensions will have to be allayed and the claims of conflicting interests adjudicated. The Government of India are assured that there is at the present moment in Bengal a strong and genuine aspiration for improved methods in the higher branches of instruction. They feel therefore that they can confidently look for the assistance and co-operation of the educated classes in carrying out the high and difficult enterprise on which the Commission has invited them to embark. They believe that these changes, if successfully achieved, will lead to a better order of things, remove any taint of inefficiency and furnish Bengal with a body of educated youth competent to further her interests in intellectual, administrative and industrial activities.

From the Report by the Directors of the Oriental Government Security Life Assurance Company, Limited, for the year ending 31st December 1919, a copy of which has been forwarded to us, we note that the total Assurances effected during the year amounted to Rs. 1,78,49,275, the annual premiums thereon being Rs. 9,82,848—13—0. The Funds now amount to Rs. 5,15,96,195, accumulated resources which afford to all Policyholders unquestionable security. It will also be noticed that during the year the Company placed on the Books the largest number of Policies for the highest amount in Sums Assured that has ever been reached in its history, an increase of over 59 lakhs on the previous year's business which also formed a record. Special attention deserves to be drawn to the fact that in spite of heavy payments for claims which arose on account of the influenza epidemic which passed over the country causing unfortunately a heavy mortality amongst all classes during the latter part of 1918, yet the Funds have increased by over 26 lakhs. The Company has kept up its great reputation and being a popular and well managed institution is bound to do an increasingly large business in the future.

PATRIOTISM AND EDUCATION— A REVIEW.*

BY C. R. NARAYAN RAO, M.A.

MR. Jones's book on Patriotism and Education is essentially a war book and it is written, as he says, with all the heat and passion of those terrible months which followed the British retreat to the out-skirts of Amiens. In the preface the author acknowledges that he has let his thoughts carry his pen wheresoever they would and accordingly his main object has been not to aim at Unity or consistency of ideas, but "a searching enquiry into the meaning of those stupendous happenings and a faithful interpretation of them." The book is therefore not an exposition of any new educational idea, but deals with topics apparently widely remote from education, like the League of Nations, Internationalism, Home Politics and Labour Problems. To my mind it appears that Mr. Jones has performed an important task. Though he may not be the first writer to illustrate the fact that the problems of Education are at bottom of the problems of life itself, he has at least succeeded in pointing out that if popular education had been founded on a more rational and popular basis, the war might have been averted by a superior diplomacy or if it did happen, there should have been less wastage of human life. At first sight this might appear to assume an untenable position, which, however, Mr. Jones fully vindicates in the series of letters which he addresses to Mr. Fisher.

The Educational conditions in India are so widely different from those of England that the problem of discussing the main theme of the book in relation of the former

**Patriotism and Education*, in the form of a letter addressed to the Rt. Hon. H. A. L. Fisher, by Henry A. Jones. Chapman and Hall Ltd. London. 3/6 net.

does not arise at all. We perfectly agree with Mr. Jones in his contention that the main object of popular education ought to be twofold: firstly the masses should be so trained as to enable them to perform their individual task with the greatest advantage to themselves and to the state, and secondly they should be provided with that esthetic equipment to enable them to adorn their daily life with grace, simplicity and unpretentious beauty. A measure of the value and tendency of the latter object is to be obtained in the theatres, the popular music halls and the picture palaces. Mr. Jones is certainly right when he holds that this sub-species of Education which the people give themselves in these places of popular amusement, occupies and exercises their minds, pins their emotions, shapes their ideals and colours their views of life and conduct to that extent that much of the higher proper education which is imparted in schools wanders out of their minds or is tucked away as mere dead fact. Indeed the standard of popular amusements represents the level of the intellectual tastes cultivated in the public schools. The condition of theatres in London is neatly summarised by Mr. Jones in the following sentence:—"I have heard a blazing popular comedian deliver lines of ill-concealed filthiness, for which his hourly rate of pay was probably ten times as much as you (Mr. Fisher) receive for superintending the education of the Kingdom." Mr. Jones's theory that the effect of popular education in England is the gradual disappearance of Shakespeare from its theatres, is in a certain sense true, for Shakespeare has strangely become incomprehensible to the average cockney playgoer to-day, whom the merest tomfoolery of a degrading and banal sort amuses far more than a representation of *Macbeth* or *the Merchant of Venice*. The practice of a wooden scheme of public education which does not vitalise the higher and finer aspects of human nature, must naturally

produce a vulgar type of popular amusements, tending towards the disappearance of the intellectual energy and the heroic element from the actual character. It is curious as Mr. Jones observes, that Shakespeare is most popular in Germany and in Berlin alone, in the year before the war, eight theatres put up twenty-five different Shakesperean productions, while 1,104 representations of *the Merchant of Venice* alone were given. Mr. Jones asks very appropriately "May not Germany well fling at us the taunt that if Music Hall and Cenematograph England, had been possessed with the spirit of Shakespeare, we should long ago have won the war." The spirit of modern mass Education in England must very largely account for the bad taste and vulgar fevers of national entertainments and even the leading London daily papers do not condemn their vicious excesses. Neither in the school nor in the theatres, have the people any opportunity of witnessing the exercise of the nobler traits of human character and models of perfection. They have combined to produce in the masses a state of intellectual and moral supineness, with the consequence that the lack of a clear political vision and a spirit of enlightened patriotism on their part, must account for the early tragedies of the war. Political leadership derives its power and inspiration from the intelligence and spirit of the people and in their absence, it only muddles through.

Mr. Jones has very sensible criticisms to make on the volume of slang of a particularly abnoxious character which the spoken dialogue in the theatres, has contributed to colloquial English. The first and perhaps the most important concern of popular education is to teach our children the right use of our native tongue. "The quality of the dialogue most approved and enjoyed by the vast audiences in our popular theatres, is a measure of the quality of the training they have received in English grammar, speech and literature." French theatres have tried

to preserve the purity of the French language and this is reflected in the manner and conversation of the lower middle classes, which in England, the diction of the corresponding classes is a grave reproach to that part of the English system of education which teaches them the English language. A man's vocabulary is the direct expression of the quality of his Education and his power to enjoy the stage literature represents the value of his intellectual tastes. The sources of national literature and the influence of its inspiration must be vitiated, if the Educational department has directly no control over that enormous output of literature, mostly slang, which constitutes the staple of theatres. To some extent slang is necessary for the growth of language, and perhaps its chief function is to correct priggishness. But abundance of vicious slang is the sign of mental depravity and a nation fed on such a pabulum must be wanting in resources of character and energy. Consider the dangers to national greatness, which a habitual use of disordered speech, tending towards mental confusion must produce.

We must pass over chapters on the League of Nations and Internationalism which in a review of this kind do not call for any comment.

As regards the first aim of popular education, *viz.*, the training to be given to the masses must enable them to perform their individual tasks with the greatest advantage to themselves and to the state, Mr. Jones begins with the story of Cicero and the Omelette. It is a condemnation of ornamental in Education, and he instances the sound and honest work of his old carpenter in denouncing the sham and hollowness of the technical and utilitarian sides of modern Education. We have much sympathy with Mr. Jones who holds that "General Education" is often the enemy of good craftsmanship and he implies that this "General Education" should be incidental or a byproduct in the case of at least the artisan community. He

points out the real dangers to the industries of the country by engendering in them a desire for the learned professions which the gradual spread of a uniform type of general education must naturally produce. Those in charge of education naturally are proud of their achievements. But what are the facts. Here is a system of education which was designed to give equal opportunities to all, irrespective of their physical and mental state of rising to any position to which their abilities might take them. At the end of fifty years both in England and in India, the system which ought to have produced comfort and content, we find the majority of men in open rebellion against their lot and its plainest Economic laws. The more Education you give them and the greater the "Progress" you make in education, the deeper their discontent becomes and angrier, their complaints. Is this the return for the money that you are expending in an increased measure on Education? Surely the fault is not in the human stuff which your Education is moulding. The war has shown that what we consider the most commonplace material is capable of rising to heroic altitude in times of stress and it is your wooden Education that warps the human mind.

We come to the main point, that Education is really a Biological problem and the sooner we interpret its problems in Biological terms, the nearer we approach to their correct solution. I wonder if any one of the multitudes of schemes and systems devised and promulgated by the Educational department for the betterment of the human lot, will achieve its object; for Education in our hands is like a wooden puzzle with which we toy. This is a perfectly sound criticism.

If our masses are not educated away from their individual tasks, in which they have to perfect themselves, but *towards* it, then there is every justification for the increased expenditure of national revenues on education. By all means, teach the people the things it most concerns them to know, but more,

teach them the things it concerns them most to do. It is this latter which fits people for their life, produces comfort and content.

In our system of education both in England and in India, the greatest forces operating against us are two kinds of ignorances. The ignorance for an impulsive need for downright honesty and truthfulness in work and the second is ignorance of our own particular work for which we are best fitted, which either we should have discovered for ourselves, have been discovered to us. Because education has not biological basis, the element of chance very largely determines the work for us who have come under the influence of public education and those who have escaped from its benefits in India, are still possessed with those virile human qualities of honesty, and truthfulness the work which is their joy of life.

Bearing in mind this physiological aspect of education, viz., that all bodily activities get strengthened by repetition, and that all conditions of life become agreeable by realising their joys, the problem of popular education becomes individualistic. How shall we educate our men so that their task in life is a joy to them and not a burden. This and not "How can we force the greatest number of boys and girls to pass certain standards of secondary education despite their faculties and their inclinations," is the question which can not be answered by the Education department through their schemes and syllabuses. It is a matter for the biologist without whom, you will be in the unwelcome position of giving "a more and more bounteous general education to a rising generation who will be less and less physically able to hold their own and who will find it increasingly difficult to earn their daily bread, while you are increasingly giving them all sorts of interesting information about most other subjects."

The book is extremely interesting contribution and political philosophers and educational experts will find it a great deal of matter put in an original and telling way. We would recommend a careful study of it, to all practical administrators.

ECONOMICS IN THE WEST.

The Excess Profits Tax.

London, 13th May, 1920.—Industrially the situation for the moment is dominated by two topics—the excess profits tax and the increased price of coal. In regard to the former it is a case of needs must when necessity drives. The Chancellor of the Exchequer must have money and he does not care very much where it comes from so long as the amount is satisfactory. Commerce represents that the excess profits tax is most reprehensible—it tends to extravagance, corruption and general irregularity and slackness. Yes, I know all that, says in effect Mr. Chamberlain, but show me something better for my purpose and I will reconsider the import. No one wants a capital levy and even a modified levy on war profits is looked at with extreme dislike. The only practical alternative is a tax on profits and there has been some amount of toying with this idea on the part of the business men. But since the Chancellor of the Exchequer demonstrated that a flat rate of taxation on profits would have to amount to not less than seven shillings in the £ there has been a decided slackening of the ardour of the commercial representatives for this particular solution of the difficulty. At the moment of writing it looks very much as if the excess profits tax would weather the storm of criticism it has provoked.

THE COAL QUESTION.

As for the coal question the modern tendencies in this trade would induce one to despair of the future of the country if we did not remember how often it has happened that crises have been overcome by the force of the innate good sense and justice of the community. Still, it must be confessed that there is not much ground for being sanguine in the outlook. On the one hand

the once dominant report trade of coal with all that it involved in the maintenance of shipping and contribution to the nation's export trade, has been vastly reduced and is threatened with still further reduction in the near future; on the other the coal for home consumption is soaring up to impossible heights or what would have been regarded as impossible a few years ago. True, trade at the present juncture is remarkably prosperous and seems likely to continue so for some little time to come. But as against this we have the increase of a dwindling output so that the demands of home industry even may be difficult to meet in a short time. Altogether it is not a pleasant situation that confronts us and not without reason the pessimists are abroad with their predictions of impending disaster. The one gleam of brightness in a dark sky is the decision of the Government to abolish the official system of control. There are many who think that to this control the present unsatisfactory state of the industry is largely due. Assuredly it has lamentably blundered and not least in its handling of the wages question.

One effect of the slackening in the British export coal trade must be to give an enormous fillip to the coal trade of countries outside Europe. Already we hear of a cargo of coal being on its way from Australia to Scandinavia. Soon probably the tale will be of ships loading coal at Calcutta for British ports. In any event the Indian coal trade has a splendid future before it in helping to fill the gaps caused by the falling off of home supplies of coal. This movement may have very wide reaching results not only on the future prosperity of India, but on the whole trade of modern industry. At present in the insolence of his supposed monopolistic power the coal miner is carrying things with a high hand. He is, indeed, practically holding the whole nation to ransom. Let him wait while until the supplies of coal from the Indian mines began to filter through to Europe and then he will

have the surprise of his life—he will find that his blackmail of the community is ineffective. After that we shall get back to moderate prices and comparative peace in the industrial world. Judging from the outlook India will be wise to put the last ounce of her energy into the development of her coal fields as a source of prospective national wealth that have no rival.

PRODUCTION OF STEEL.

How greatly steel production has increased in Great Britain in recent times was well brought out in the proceedings of the Iron and Steel Institute at the annual meeting of the organization few days since. Dr. J. E. Stead the President, mentioned that whereas before 1914 we had very few electric melting furnaces we now had a great number as a result of the operations of war which necessitated this provision in order to deal with the enormous mass of steel borings produced. In pre-war days in this form of steel production Germany was pre-eminent and Great Britain came only after the United States, Italy and France. Now production in this country was surpassed only by the steel production of the United States and Germany. By the end of 1918, our output had gone up by fifty per cent on the pre-war figures. An interesting feature of the Institute's meeting was the reading of a paper by Mr. Edwin H. Lewis of Wishaw describing the process of making cement from blast furnace slag. Such Iron Portland cement, he stated, could easily comply with all the British Standard specification tests, except that of specific gravity and there was no reason why it should not be used any purpose for which Portland cement was used for sea water, he added, it should be especially suitable. Thus, it happens that another waste product hitherto a mere costly impediment has become a valuable commercial asset.

Referring to steel it is impossible to overlook the great British Canadian Steel combine which has been one of the financial

sensations of the month. Something like one hundred millions of capital is said to be involved in this transaction and the organization will be practically all embracing of the British Steel interests on both sides of the Atlantic. Great play is being made of the fact that the combination is all British and it might almost be inferred from some of the comments that the step just taken is only a preliminary to a complete organization of the Steel resources of the Empire. In that event, of course, India will play a very important part in the future of the Trust and Australia's share also cannot be negligible. The entire scheme, however, is a little too ambitious to be accepted without reserve. Probably it will be found in the sequel to be little more than a British counterpart of the American Steel Combine designed to a large extent to regulate world prices for steel. Anyway, they are highly critical of the arrangement in Canada and are making accusations about "watered capital" which rather suggest that there is an underlying financial story to be revealed.

PAPER PULP PRODUCTION.

In view of the paper shortage, which is very serious and is likely to become worse, we are told, many suggestions are being made for the provision of substitute raw materials to replace the scarce wood-pulp. One of the most practical and stimulating is put forward by Sir Johnston the well known African expert in a letter to the *Times*. "Why" asks this authority, "should not the attention of chemists and manufacturers again be given to the coarse, grasses, reeds and rushes of tropical Africa between 15 deg. of North latitude and the basin of the Zambesi river?" This form of herbage, he goes on to say, is almost a curse to Central, Western and Eastern Africa, because it kills other and more useful vegetation and still more because it is a harbourage for noxious insects. Before the war paper making experiments were set on foot

will the sudd grass as a medium. Could they not be renewed, the writer asks? Undoubtedly they ought to be taken up again and not only that in every tropical dependency of the Empire a similar set of experiments should be conducted. India especially offers a vast field for research on the lines indicated. Much has already been done in this direction but it is questionable whether more than the fringe of the question has been tackled.

Even supposing that the grass products of India are unsuitable for paper making there should be in the higher altitudes of Northern India and possibly also in the mountain ranges of Southern India great possibilities for the production of trees suitable for pulp. At present British paper manufacturers are largely dependent on Scandinavian supplies for their raw material and extortionate prices are being demanded. What is needed, as the *Times* points out in an article to-day, is that home manufacturers should be able to draw their supplies from places within the Empire. Canada is practically mentioned, and no doubt the dominion resources in this respect are very great. But there must be also in the portions I have indicated a fruitful field in India for this paper pulp production. A desideratum of a successful enterprise is stated to be cheap and convenient water power. There is this in abundance in the Himalayas and also in Nilgiris and the Shervaroys. Altogether the subject appears to be well worth the serious attention of those in authority in India.

SIR J. C. BOSE.

Sir J. Bose's admission to the Fellowship of the Royal Society is an interesting and significant event. It used at one time to be thought and said in the West that the modern Indian mind was not original and that scientific development in the country must come from outside inspiration. But Sir J. Bose has proved to demonstration that Indian

scientific thought is creative and progressive, and not a whit behind Western work in its more subtle aspects. The success is the more remarkable as it was achieved in the face of a strong opposition based, be it said, not on racial prejudice but on the conservative instincts of a particularly conservative body of men. What has been done in this case should remind young India of the opening that are before it. From science of the type of the discovery of Sir J. Bose to the applied science which gives industry its chief force is but a short step, and there must be among the rising generation of India many who are capable of emulating Sir J. Bose's work in directions which will bring prosperity to Indian Industry.

ARNOLD WRIGHT.

According to the British Vice-Council at Granada, Spain, a local manufacturing concern has erected a factory to manufacture thread from paper and to weave cloth for the packing of their products. The raw material or paper paste, which is required for the manufacture of the thread, is obtained from eucalyptus wood. The process for its manufacture is described as follows:—With the wood paste destined for the weaving machine, paper is first fabricated. This is then cut in long and narrow strips, like ribbon, similar to what is used in telegraph offices, and like them are rolled on small reels. Each reel is placed on a spinning-wheel, which is held in position by a needle which revolves with a velocity of 5,000 to 6,000 revolutions per minute. By this means the strip of paper is twisted and forms a kind of tube which, so far, is neither very fine nor very strong. To make it of greater resistance it is soaked in a special kind of glue, which at once becomes indissoluble, being exposed to thermal vapours. In this way the thread can again undergo another stretching or straining, and remains fine but stronger.

INDUSTRIAL NOTES FROM THE UNITED STATES.

Bread From Cotton Seed Flour.

Washington, D.C., U.S.A., May 23, 1920.—

There is a deficit of about four hundred millions of bushels of wheat in the United States, if the needs of our citizens and of the European peoples are to be considered.

Various grains and plants, many of them containing a high percentage of starch, are available. It is the chemical processes that are not fully perfected to make these substitutes thoroughly palatable and acceptable. These substitutes vary from flour obtained from potato to that derived from the banana.

New Orleans, Louisiana, has recently come forward with a brand new kind of flour—a kind, in fact, that is said to be giving a greater measure of satisfaction than any other except that which is derived from wheat itself. The new flour is being extracted from that formerly despised waste, the cotton seed.

From an average acre of cotton plant over five hundred pounds of cotton seed can be obtained. Modern machinery that was developed after a considerable number of years of experimentation can now turn all the contents of the seed into a flour as fine as wheat flour. The cotton seed meal thus obtained approximates 225 pounds to every 500 pounds of the seeds themselves.

If a mixture of wheat be made with cotton seed flour—three parts of the one to one part of the other—a very satisfactory and palatable bread is produced from the combination.

The output of cotton seed flour runs into a great many tons per day in some of the mills. One of the largest mills produces over twenty tons per day. Now, if the Europeans are willing to accept the adulterated product, for every three tons of wheat

we could ship them we could easily add one ton of the new kind of flour. As the substitute will consist of but twenty-five per cent of the whole, and as it is perfectly palatable and nutritious, it would seem as if the bread-rationed Europeans ought to be glad to welcome cotton seed flour in place of the very dubious adulterants that have, in many instances, been making up the bulk of their flour stocks.

But even with Americans the combination is being well received. Bread made from it is said to have a remarkably good flavor and to be very satisfactory. There can be no question, the experimentators state, of its nutritive value. Chemical analysis shows it to be very rich in protein. Indeed, it would give us a better body-building bread, to accept the amended variety as against the kind we have been accustomed to from our childhood. We now know that scientific dietetics can improve upon the traditional regimen of the ages.

For those, however, who would stick so closely to the grains known to man for thousands of years there is always rice to be had in place of the customary wheat. From rice, flour can readily be derived. It is true that when this is mixed with wheat—or, indeed, baked separately into cakes—the product tends somewhat to pastiness. But this is said to be of no vital importance, either as to food value or as to digestibility. Everyone knows by this time that rice is one of the most readily digested foods mankind has ever discovered. Still, rice flour does not seem to make an entirely satisfactory impression on the American palate.

One type of substitute that has not proved very satisfactory, either to Americans or to Europeans, is that derived from corn. Europe has never taken very kindly to our corn meal. It is there regarded chiefly as a food for hogs and cattle, and the prejudices and antipathies of centuries cannot be overcome in a season.

It is predicted in many sources in the United States, however, that the discovery of the value of the cotton seed flour will prove of epoch-making importance to the world.

EVERYBODY CAN AFFORD TO OWN A CAR NOW.

Automobile manufacturers throughout the United States have long endeavoured to make a small car that would appeal to the masses, both from the standpoint of price and of appearance—bearing in mind, of course, the essential factor of durability and serviceableness.

The “flivver” has held undisputed sway in this field for many years, but with its rapid increase in price, in common with all makes of cars, since the war, it, too, has soared out of reach of the average man’s pocket book.

A car in the neighborhood of three hundred dollars in price is the limit for the great majority of people, and this part of the multitude of would-be automobile owners apparently now is going to be satisfied in that respect.

At any rate, a middle west automobile manufacturer—who now manufactures a high-grade and popular car—has designed a light car whose price is only two hundred and ninety-five dollars. It comes equipped with electric headlights, tail lamp, storage battery, pump and jack. Its tire prices are low, as their size is only 28x3 inches.

There is a ten-inch saving over the standard tread, enabling the car, because of its small size, to get through crowded traffic on the thoroughfares that larger automobiles would not attempt. Yet this smaller size does not interfere with country road traveling, as the tread is wide enough to enable the car to straddle the ruts.

An advantageous feature of the car is that it is not necessary to lift the hood for inspecting or repairing the motor, which is reached from the front. A camouflaged radiator is opened as a door, revealing an

efficient two-cylinder motorcycle engine of from nine to thirteen horse-power.

The "upkeep" of this model automobile is said to be exceedingly low. It is estimated that the car can be used for delivery purposes for the small sum of four dollars per week. This allows thirty cents per gallon for gasoline for the maximum of 250 gallons of gasoline (\$75) and \$125 for tires, oil and repairs for the twelvemonth period.

MAKING LINEN FROM FLAX STRAW IN AMERICA.

The interesting problem of making linen from flax straw in the United States is a new industry which is being developed by a colony of Lithuanians in the state of Wisconsin. These people are demonstrating how they have been able to rival the Irish in the making of linen thread from the tops of flax plants, of which many thousands of tons are wasted annually, both in the United States and Canada.

In this work, the despair of the American farmer is the process of "curing" the flax tops. In Lithuania, the tops are spread out in two or three inches of water, and are allowed to remain long enough to rot the outer husk without affecting the fibre.

Following this the flax straw is bundled like wheat and left in the fields for a time, and is then placed in sheds for curing the tops by kiln-drying. When the drying is finished the fibre is ready for machining by home-made equipment, by which the fibre is separated. This fibre is spun by women into linen thread for weaving fabrics. The color of the natural thread is determined by the method of treatment in the rotting process.

ARE WE TO RIDE BY MONORAIL?

The satisfactory solution of transportation problems in the large cities, in these days of constantly-increasing costs of operation and maintenance, is the all-absorbing question in the minds of inventors and traction experts throughout the United States. The present

facilities for accommodating the tremendous volume of traffic in congested business districts are sadly inadequate during the day, to say nothing about the "rush hours" when veritable multitudes must be moved to and from factories and offices.

The United States has attempted to solve these problems in several of the large cities by the use of a suspended monorail system. The inventors of this suspended monorail system point out many advantages in this method of transportation. Cars of the monorail type, although longer and seating more passengers than those used on the well-known elevated lines, weigh only about one-third as much.

The lighter construction reduces the original cost of both the structure and the cars. Materially decreased use of power, much greater ease in starting and stopping, and more than double the present rate of speed are other results claimed from the use of the lighter car.

The inventors of the monorail system also point out the added advantage of permitting the use of a resilient material in the wheels which entirely eliminates the nerve-racking roar of other systems.

A double-track monorail system can be carried along a street on thirty-six-inch concrete center pillars placed at fifty-foot intervals, taking up about the same space and serving the same purpose as the usual "isles of safety" at street intersection in the crowded districts of the larger cities.

UNCLE SAM'S EXPERIMENTAL FLOUR MILL AND BAKERY.

One of the most important and interesting activities of the United States Department of Agriculture is that of promulgating grading standards for wheat and other grains, and the problem of evolving workable standards based upon intrinsic value involves the study of factors influencing milling and baking qualities. Scientific milling and baking, therefore, have received the attention

of a corps of investigators, and an experimental mill and baking laboratory, just installed at a cost of \$60,000, has made it possible to secure a vast amount of valuable information which has been heretofore unobtainable.

This mill and bakery is really a series of laboratories, each equipped for doing a particular part of the investigation work. The wheat samples obtained for testing purposes first pass through the grading laboratory, where a complete mechanical analysis is made of each sample and a detailed record kept of its condition, physical characteristics, purity and soundness.

After this operation is completed the samples pass into the hands of the miller, who puts them through the cleaning machinery, where, they are handled in practically the same manner as in the commercial mill cleaning department.

The equipment here consists of two grain separators and a scourer. Once cleaned the sample is ready for tempering.

Every type and condition of wheat grown in the country is met with in the course of the work of this laboratory, and owing to the fact that the treatment required for the various samples differs greatly, depending upon its physical character, the judgment of the miller must be assisted by definite information concerning the sample. In this he has before him the record obtained in the grading laboratory, which includes the very necessary data regarding the moisture content.

The milling is done on a small non-automatic testing mill consisting of four single stands of 6 by 6 inch rolls, three corrugated and one smooth. This mill is so operated that the flow of a five-break nine-reduction roller mill, such as is in commercial use, can be closely imitated.

After a short period in storage the flour produced in the mill goes to the bakery, where its actual quality is determined by its

conversion into bread under standardized conditions. This bakery is equipped with dough-mixing machines, an electrically-heated fermentation cabinet, in which the heating is automatically controlled, and an electric baking oven constitute the main equipment for making miniature loaves of bread.

HOW AUTOMOBILE ENGINES ARE TESTED.

The tractor, like the passenger automobile, or the truck, has for its most important feature the engine. This must always be given a most thorough test. There are several tests which a new car is ordinarily put through preparatory to its being placed on sale

First of all, the engine is run under some power other than its own. Then it is run under its own power, under load. While this is being done the final adjustments are made and a reading made.

Many manufacturing companies do not make tests on perhaps more than four per cent of their passenger cars. This is not necessary, because such a vehicle is not driven under full load, except on rare occasions.

An apparatus known to the trade as the Prony brake is an important instrument in determining the brake horsepower the engine is developing, and also to impose a continuous load on the engine, so as to accurately test it. Brake horsepower is the power delivered at the fly-wheel, or at the power take-off pulley, if the engine is mounted in the chassis.

With the Prony brake it is possible to transform the power at the flywheel into force that may be measured with a scale in pounds, so that the exact engine efficiency may be determined.

PLATINUM PRICE IN UNITED STATES \$165 AN OUNCE.

The low price of \$99 an ounce for platinum was reached in the United States in March, 1919, and was maintained about a month. Government stocks were then about

exhausted and in April of the same year the price jumped to \$110 an ounce. Since this date the price has continued steadily to advance until on May 15, just passed, it was quoted at \$165 per ounce.

The demand for the metal has been remarkably strong, but the supply has ever been short. The normal domestic production is between 7,000 and 10,000 ounces annually, and shows no material increase over the latter figure as time goes on.

The wide search made in the latter part of 1918 for domestic sources of platinum yielded little result. Colombia, South America, promises to furnish more crude platinum this year than in any past year, but its producing capacity is limited by the methods employed in washing the gravels from which the metal is obtained. Practically no supplies can be expected from Russia for several years. The osmiridium fields of Tasmania is producing somewhat less than 2,000 ounces annually and this appears to be their limit.

According to a statement of the United States Geological Survey, the production of platinum, in the United States and in the world, is practically at a stand-still, with the demands constantly and steadily increasing. This will have the effect of forcing prices up.

ALFRED T. MARKS.

Discussing the probable development of the large turbo-generators now used in power stations and on board ship, a paper read recently before the British Institution of Electrical Engineers by Mr. J. Shepherd suggests that water-cooling is inevitable. Mechanical strength and durability would, the author is convinced, be increased and the risk of fire or heating diminished by the adoption of this change. He predicts a longer physical life for turbo-generators in consequence, and points out that this factor is of enhanced importance as a result of the world-wide rise in the cost of plant.

NOTES.

The Norwegian Ministry of Industry has embarked on a policy of developing and supporting the iron and steel industry with a view to making the country independent of foreign supplies as far as possible. One of the schemes is the large State-supported iron and steel works at Narvik, in which it is estimated that an annual production will be achieved of 169,000 tons of coke, 125,000 tons of pig iron, 125,000 tons of steel billets, 25,000 tons of phosphate, 95,000 tons of rolling products. During the war Norway experienced great difficulties owing to the shortage of iron and steel manufactures, which she had formerly obtained almost exclusively from Germany. There is consequently a strong feeling in the country at the present time that Norway should smelt her own iron ore. A grant has now been made to a well-known Trondhjem firm, who are to erect an experimental installation for the reduction of oxidic iron ore by means of gas heated to 900-1,000 degrees, celsius. After crushing has taken place the iron in the ore is to be separated magnetically and the superfluous stone, etc., is to be carried off without undergoing smelting. It is claimed that this process produces an iron which is free from sulphur, and that the phosphorus present disappears during the separation. The temperature at which the process is conducted is lower than the temperature for the reduction of phosphates. It is similarly claimed that the product is free from carbon, and that it is therefore well suited for the production of steel. The gas employed for reduction is to be produced by the introduction of a fluid fuel or gas distilled from coal into an electric high-tension flame of the kind used in the nitrate industry. It is stated that this process was invented in Sweden, and it is considered that it is particularly suited for low-grade Norwegian ore.

The Norwegian Government has also been authorised to take shares in a third company up to one-third of the company's capital (provided the sum does not exceed 500,000 kroner) for the purpose of producing pig iron by the electric process. The Government has also been authorized to guarantee a loan of 150,000 kroner to another company for the production of the electrodes necessary in connection with the foregoing.

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H. M. Vice-Consul at Ghent writes in the *Board of Trade Journal*:—A report has been issued by the Co-operative Textile Society of Ghent, on the revival of the Belgian Cotton Industry. During the war the Germans systematically despoiled the mills of all their raw material and of a portion of their plant, but the industry has rapidly recovered and has been among the first in Belgium to resume operations, thanks to the organization devoted to its reconstruction. Foreseeing an inevitably difficult position, the spinners constituted the Co-operative Society "La Textile" before cessation of hostilities, and, immediately upon the Armistice being signed, this society grouped orders and purchased the raw material and machinery necessary for resumption of spinning. The organization of "La Textile" has been of assistance in surmounting difficulties of credit, which are very real owing to the necessity of obtaining all raw material from abroad. Nevertheless, the first shipments of cotton after the liberation of the country arrived from the United States as early as 20th February, 1919. The mills gradually resumed work, and by the end of 1919 there were 1,200,000 spindles and 160,000 twistors in activity. To illustrate how great was this recovery it is sufficient to note that the Belgian cotton industry comprised 1,518,000 spindles in 1914, and that of this number 80 per cent were again being worked on 1st January, 1920. At that date the spinners alone as apart from the weavers, were employing about 12,000 workpeople. Existing

conditions, however, present difficulties—instability following upon the continual rise in rates of exchange, augmentation of wages, and increased cost of coal and working expenses—and the necessity of grouping together the interests of the industry, has shown itself more and more. Consequently, spinners have come closer together during the last few months and have entrusted their interests to the care of "La Textile." It is said that the new organization will make it possible to obtain gradual specialisation in the mills and to regain the former reputation of Belgian spinners by assuring perfection of manufacture and reducing cost of production.

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H. M. Consul at Para writes of the Amazon Rubber Industry in 1919:—So far as the rubber trade was concerned, the year 1919 may be described as disastrous. The start was promising and hopes were entertained of an increased demand and improved prices, but the year closed with a record of depression such as has never before been experienced in the history of the industry. Two chief causes contributed to this result. The first was the participation of the Banco do Brazil in the market, the second was the phenomenal rise in exchange during the latter part of the year. It is recalled that in 1918 the Banco do Brazil entered as a rubber buyer, paying 50 reis per kilo in excess of the current market price. A stock of over 3,000 tons of fine rubber was thus accumulated, and it was not till September-October, 1919, that this quantity was shipped on consignment to New York. The dumping of 10 per cent of the whole Amazon crop on the United States market, within two months, created a glut and a consequent depreciation in the value of the local product. The total amount of rubber received at the port of Para during 1919 was 20,632 tons, which came from the following districts:—

	Tona.
State of Para ...	5,849
State of Amazonas ...	172
State of Matto Grosso ...	16
Acre Federal ...	6,101
Bolivia ...	3,928
Peru ...	1,367
Unclassified ...	3,199
Total ...	20,632

In 1918 the receipts were 24,885 tons. The decrease last year was attributable to the shrinkage of production due to prohibitive costs, and unless there is a definite improvement in the market a further decrease may be expected from the ensuing crop. As it is, many rubber workers have deserted the forests for the towns owing to the unremunerative nature of employment on the rubber plantations.

As a result of representations made to the Spanish Government by the Chambers of Commerce and other commercial interests in Barcelona, requesting that steps should be taken for the establishment of organizations and of rules which would permit of an amicable solution of any differences which might in future arise between employers and employees, a Royal Decree has been published, to the effect that the business of Barcelona shall, for this purpose, be considered to be divided into four groups, *i. e.*, Banking, Transport, Wholesale business, and Retail business. Each of these groups shall be represented by a Committee, consisting of an equal number of representatives of employers and employees, and with the object of harmonising and unifying the action of these four Committees a Mixed Commission is to be appointed. The four Committees shall have conciliatory functions, and all their resolutions of a general character for the respective groups they represent, referring to wages, hours, and regulations controlling work, etc., shall be submitted for the approval of the Mixed Commission, without which they cannot be brought into force. They

shall also put before the Mixed Commission, with all possible data, all those questions in regard to which they have been unable to find a solution. The duty of the Mixed Commission shall be to deal with all the matters submitted to it by the above-mentioned Committees; it shall fix minimum wages for each commercial group; it shall superintend the fulfilment of the social laws in force, and shall propose to the authorities the measures and reforms which it may consider necessary in the interests of the community it represents.

It is predicted that the value of this year's sugar crop may reach a total that will almost equal, if not surpass, the value of the last three years' crops put together. April prices were, according to the Canadian Trade Commissioner at Havana, 13 cents a lb. f. o. b. Cuba for crude. This year's estimated production of 4,200,000 tons will, on this basis, be worth in the neighbourhood of 1,200 million dols. On an estimate of 10 cents a lb. as the average price Cuba will get for this season's crop, the value of her sugar will be 940,800,000 dols. on an estimate of 4,200,000 tons.

This compares with former years as follows:—

Year.	Exportation* by long tons.	Estimated Average price per lb. Dols.	Total value. Dols.
1917 ...	2,896,148	0.005	322,368,576
1918 ...	3,210,754	0.045	324,937,179
1919 ...	3,825,239	0.055	471,269,445

The following table shows the distribution of the sugar exported from Cuba during the calendar year of 1919:—

	Tons.
United States ...	2,929,335
Canada ...	81,996
Spain ...	27,374
Mexico ...	1,127
South America ...	130
Europe ...	785,277
Total ...	3,825,239

*Cuba exports her entire production of raw sugar with the exception of a few thousand tons.

The Italian Authorities are endeavouring to correct the adverse trade balance of the country with great energy by the now usual methods of controlling foreign credits and exchange operations, and of imports. The latest device is the ear-marking, by a Decree of 15th April, of the quantities of certain articles of luxury for home consumption, with the object of increasing the surplus available for export. The quantities for home consumption are fixed on the basis of total quantities in the course of manufacture and of stocks in hand. This naturally involves the control of distribution and of selling prices in the home market. In some cases the sale of certain home-produced luxuries is to be forbidden entirely in Italy, but these are not specified in the Decree. Side by side with these provisions foreign drafts obtained in connection with these exports are also placed under the control of a central authority.

The Madras Agricultural Department has just brought out and is distributing gratis to ryots in South Kanara a leaflet on Tapioca cultivation. Tapioca as a food stuff is as important to some parts of South America as rice is to India, and it is by no means certain that it may not some day be recognized as one of the staple foodstuffs on the west coast of India. It has long been cultivated in Travancore and Cochin, and since the rise in the price of rice, the people of Malabar have been rapidly learning to grow and use it. The Agricultural Department is now trying to introduce it into South Kanara where large areas of dry lands, now little used, are believed to be quite suitable for the cultivation of tapioca. Hence this leaflet which explains the method to be followed in cultivating and harvesting tapioca. A Kannada version of the leaflet is being printed and will be issued shortly. We are publishing the leaflet elsewhere in this issue in full.

Experiments in flax growing which were commenced in the Casablanca district in

1918, proved so encouraging that in 1919 the firm (French) conducting the operations inaugurated a flax-growing farm some forty kilometres south of the port and erected a flax-spinning mill thirteen kilometres from the town. At the same time they gave out seed to farmers who were ready to grow flax, making contracts for the purchase of the crops. The results in 1919 again proved encouraging, and it would now appear as if the flax-spinning industry has come to stay. The straw produces 10 per cent of flax, and the quality of the flax is reported to be on a level with the Russian article. According to a Lille journal labour is abundant in the region of operations, and during the past year there were more applications from natives for seed for growing purposes than could be satisfied.

A South African Cattle Breeders' Association is to be organized as the result of a resolution passed recently at a representative meeting of South African cattle breeders in Johannesburg. According to the resolution, the Association is to frame and observe a uniform policy in the handling, marketing, and exporting of cattle and their products, and generally to do all that may be necessary for the protection of cattle breeders, for the expansion of the cattle-raising industry to their advantage and profit, and in the interests of the consuming public. South African breeders feel that there is an opportunity at the present time to raise the quality of South African beef in the world markets. Organization is considered to be necessary to improve the present strain. It will then be possible to establish in South Africa the nucleus of an industry which may take a leading place in international trade.

A Madras Government Order (No. 498 L., dated 22nd May 1920) says:—The Government have been reducing the number of nominative seats on local bodies. This number will be still further reduced when

the new District Municipalities Act and the proposed amendments of the Local Boards Act come into operation. The few nominative seats that will remain are mainly intended for the representation of minorities and of depressed classes. Under these circumstances it is inevitable that the number of departmental officials nominated as members of local bodies should be reduced. If at any time a local body should need the advice of such an officer, he should be invited to the particular meeting at which his assistance will be actually required.

The manufacture of paper-pulp calls for an enormous quantity of raw material, and this demand in course of time will become more and more emphatic. On this subject a French authority states that the sea-weed or sea-wrack possesses the desired properties for the production of a good paper pulp, and that it offers the following economical advantages. Besides furnishing a crop that is very abundant, this sea-weed can be left to dry on the spot, and, before collection, cleansed by a rudimentary shaking process. For transportation it can be put up in bales. For its transformation, a moderate heating would suffice.

The (British) *Board of Trade Journal* has issued with its impression of June 3rd, a survey of the German Iron and Steel industry by Mr. C. J. Kavagnagh, British Commercial Commissioner at Cologne. There is apparently a regrouping of interests as the result of the Treaty of Peace. Of these the possibility of the participation of foreign capital in some of the groups seems to be one.

As a result of the paragraph which appeared under the above heading in our issue of 20th May, the Thames Paper Company, Limited, has carried out an experiment on the sea-weed that is to be found in the estuary of the Thames, and which is a fairly

common type along the shores of this country. This was dealt with in the Company's laboratory, and the chemist's report is given below; from this it will be observed that the fibre contents of this sea-weed is practically nil. It is probable, however, that the type of sea-weed suitable for this purpose is somewhat different, for, as stated in various issues of this "Journal," viz., p. 837, 29th March, 1917; p. 698, 4th December, 1919; and p. 238, 12th February, 1920, companies have been formed in Italy and Japan for the purpose of exploiting sea-weed in this way. In 1917, the South Australian Department of Chemistry published a Bulletin on the subject. (See the "Journal" of 7th June, 1917, p. 554.) As the possibility of utilizing this raw material in the manufacture of paper is of great interest at the present time, further enquiries are being made into the question. The chemist's report referred to above is as under:—Samples from the local foreshore have been carefully examined from the above standpoint:—

Water content, 73.50 per cent (as received).

Bone dry weight, 26.50 per cent.

This latter was chiefly dirt and foreign matter, salt (sodium chloride and other halogens), and colloidal substances akin to gelatine. The amount of fibre was practically negligible and was extremely difficult to isolate on accounts of the "Colloids." Cellulose was not worth estimation, and the sample was useless as a raw material for paper-making.

GLEANINGS.

The war has raised the price of tinplate, glass, earthenware, and all materials used for packing foodstuffs for transport or storage. This has borne heavily on certain Indian manufacturers, especially of jams and other commodities. In these circumstances, paper containers have come to the rescue in the shape of Mono-Service Containers of which over 100 millions have been used for packing foodstuffs since 1907. They are hygienic, wholesome, attractive and unbreakable. They weigh about one-seventh the weight of stone pots and occupy two-fifths of the space of containers that do not nest. They are used for honey, syrup, jam, drugs, confectionery and other commodities and are waterproof. They need no labels as the contents are printed on the outside. These containers may, in some cases, be used again for other purposes. They are evidently an off-shoot of the paper milk bottle and paper bucket manufacture. The agents for India are Messrs. Gladstone Wyllie and Co., Ltd., Calcutta.

If you happen to have a farm that is not profitable you might turn it into an umbrella plantation, advises *Providence Journal*. Perhaps you have always regarded the knobs and crooks and odd twists that characterize the wooden handles of umbrellas as mere freaks of nature. As a matter of fact, we are informed upon good authority, says the journal, that they are the products of careful cultivation. In France, there is said to be a plantation of 500 acres devoted entirely to raising queer sticks for umbrellas, canes, and riding whips. In the process of cultivation, the trees are cut a little above the ground level and a number of sapplings sprout from the roots. The buds of these sprouts are nipped off, and by cutting the bark and training the shoots almost any variety of

design may be produced. After three years or so the crop of umbrella handles and canes is harvested, and after the necessary treatment the product is ready for the market.

The description of a scheme for building a net of tube railways in Calcutta, which appeared quite recently in the Indian newspapers has created considerable interest in engineering circles in England while, according to reports the scheme is being closely studied in America. The Chairman of the Calcutta Corporation, in outlining the scheme to the Communications Committee, wrote that there should be no serious obstacle to the construction of a tube under the Hoogly, and in this way the suburb of Howrah could be linked up with Calcutta. The poorer classes were being crowded out of Calcutta by the increase of rents and land values, and would readily migrate to the suburbs if cheap and rapid transit were available. An estimate of the cost given was £650,000 per mile. While the scheme is not yet formally adopted, the committee approved the views expressed in the chairman's letter.

According to the American Consul in Seville, rents have become so high that many poor people are forced to leave the City, and it is felt that the demands for higher wages would cease, or at least be reduced, if labourers could find houses at a moderate rental. As there is practically no lumber in Spain for building wooden houses, and the expense of constructing them of brick is prohibitive, it has been suggested to the civil authorities that portable houses might be imported from the United States. The city owns a large tract of land along the Guadalquivir River, and it is planned to erect houses of from two to four rooms on this property for the use of the labourers, the occupants paying rent to the city for the use of these houses. At present a thousand such houses are being considered, although more will probably be needed later.

A method of utilizing the bark of a large variety of eucalyptus trees for commercial purposes in Australia is reported to have been discovered by a local resident, states the *Weekly Bulletin* of the Canadian Department of Trade and Commerce. It is claimed that from the bark there can be made a fibre suitable for the manufacture of twine, rope and bagging of a quality equal to, and at half the cost of, the best flax and Indian jute goods. The inventor of the process has been experimenting with the bark for fifteen years, and has available for inspection in his factory near Melbourne, samples of twine, binder twine, light and heavy rope, and bagging from which bags for onions, potatoes, wheat and wool can be made.

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A new form of aluminium called "conducting aluminium M. 277," is reported to have been invented by Dr. Georges Giulini, of Basel, Switzerland, the well-known aluminium expert. It is produced by subjecting commercial aluminium to a patented process by which it acquires mechanical qualities resembling those of bronze, copper and brass, without changing its specific weight. It is said that the price of new metal can be kept within very low limits; so that, owing to its low specific weight, it will be able to compete with copper and brass. The inventor anticipates for it a good market among the builders of motor-cars, aeroplanes, ships and railway carriages, and in the electrical industry.

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The Hornite Works Joint-stock Co, has been recently founded at Dusseldorf, with a capital of M. 300,000. Hornite is an ebonite substitute prepared from industrial residues, which in appearance and wearing qualities not only replaces ebonite, but will, it is said, owing to its extraordinary cheapness and special qualities, drive it off the market. Hornite can be used for door handles, window pushes, walking-sticks, telephone

installations, cycle handle-bar grips, and various technical or surgical purposes, says the *Kölnische Zeitung*.

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In order to purify sulphuric acid and to obtain useful products the acid, according to British Patent 126,714, after treatment with sulphuretted hydrogen, is well agitated with a liquid hydrocarbon, such as paraffin oil, in quantity in accordance with the amount of arsenic in the sulphuric acid. The scum which passes from the agitator is removed and the acid is poured into tanks. The scum is well washed with water in order to recover the liquid hydrocarbon for re-use.

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"Paka Kusum" or Macassar oil is the oil expressed from the seeds of the lac tree (*Schleichera Trijuga*) belonging to the Natural Order *Sapindaceæ* which includes the well known Indian soapnut (*Rita*) plant. It is also known as the "Kusum" tree and the Ceylon oak. The seeds yield about 70 per cent of an oil which is used in many parts of India as a hair oil, as an illuminant and as a medicine for external application in certain forms of skin diseases.

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Compressed cellulose piping is reported to have proved a very satisfactory substitute for metal piping for hot and cold air, corrosive acids, and other materials, though not suitable for steam. It is made absolutely non-porous, and as it can be worked like wood and is lighter than iron, it is easily moved and repaired. Besides being resistant to chemicals, it is a bad conductor of heat, making insulating coverings unnecessary.

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A chemical industry which has grown up in Sweden on the basis of Swedish inventions is the production of spirit from waste lyes obtained in the manufacture of sulphite cellulose. These lyes had previously been run off as waste into rivers and lakes and had merely served to pollute the water. The output is estimated to be from twelve to

fifteen million litres, reckoned at a strength of 100.

Thus writes Mr. A. S. Gregg in the *Brick and Pottery Trades' Journal*:—"You have a shilling, I have a shilling. We swap. You have my shilling, and I have yours. We are no better off. But suppose you have an idea, and I have an idea. We swap. Now you have two ideas, and I have two ideas. We have increased our stock of ideas 100 per cent."

Lightning conductors should not be provided for the protection of oil tanks is the advice given in a pamphlet issued by the Petroleum Executive. The tanks, being metal structures, efficiently protect the contents, and the addition of lightning conductors might in some cases increase the risk of ignition of the vapours from the oil.

Horse shoes of paper, expected to be as durable as steel, have been suggested. The material could be built up from properly shaped sheets of parchment paper with a binding cement of turpentine, shellac, and litharge-treated linseed oil. It is claimed that the shoes could be durably attached by means of nails or rubber cement.

Synthetic cast iron is the name given in France to castings produced in the electric furnace from steel scrap, with suitable additions to increase the carbon content of the metal. According to M. Pinot, the process was extensively used in France for making shells during the war.

One of Holland's greatest difficulties as an industrial country has been the high cost and consumption of coal in all her industrial undertakings. This it is now proposed to remedy by an extensive scheme of electrification, embracing practically the whole country.

Thus Mr. W. Tongood in the *Agricultural Bulletin of the F. M. S.*:—"It has been proved beyond shadow of a doubt that clean clearing is imperative on a rubber estate if diseases are to be kept in check.

By soaking wood in a mixture of boracic acid 6 parts, ammonium chloride 5 parts, sodium borate 3 parts, and water 100 parts, it is rendered waterproof.

Venezuela has now 26,000 acres of land under sugar-cane and yielding 30,000 tons of sugar. Efforts are being made to increase the area under cane cultivation by providing proper transport facilities and new factory machinery.

Passenger railway fares in Belgium have been raised by 10 per cent, and freight rates 50 per cent.

A new air service for passengers, mails, and merchandise has been opened between Paris, Dijon, and Bourg.

Owing to the high prices of rice and inability to obtain sufficient supplies from India, the Government of Mauritius has established a rationing system.

A company which has been formed for the manufacture of bags, rope, matting, etc., from the fibre of *Hibiscus Cannabis* (Decan hemp) has commenced operations at Umtali, Southern Rhodesia. The plant grows wild in most parts of Rhodesia.

Ontaria's gold production for 1919 was 505,963 oz., of a value of \$10,451,688. Its gold output now exceeds that of any other Province in Canada or State of the American Union, California alone excepted.

ECONOMIC NOTES.

AGRICULTURE.

Conservation of Cattle Urine.

The following note on the above subject, prepared by Mr. H. B. Sampsoo, Dy. Director of Agriculture, Madras, has been Reprinted by the Publicity Bureau :—

Experiments have been made by the Agricultural Department of the Central Provinces to test the value of cattle urine as a manure. This has been found to be of very great value, and under certain conditions the urine collected from one bullock has been found to be of great value, and under certain conditions the urine collected from one bullock has been found to be of greater value than the dung of the same animal collected during the same period.

The following is the method of conserving cattle urine as adopted in the trails above referred to :—

"On the floor of the cattle-sheds spread 6 inches of fine dry earth kept in position by means of a plank of wood of the same depth. The earth absorbs the urine and retains the nitrogen and is therefore a most valuable manure. The surface of this layer of earth should be kept loose and powdery by stirring it daily with a *mammottie* or other tool. The earth should be stored in a pit or spread in the field after it has been allowed to lie for about a month in the stall; a fresh layer should then be put into the stalls."

Some modification of this system seems quite capable of easy adoption in this Presidency. Such a system, if adopted, should add much to the comfort of the ryots of the Ceded Districts, and in other places where cattle are kept in the dwelling-house. An adoption of this method would mean a clean and odourless floor and better health both to the people and to the cattle, while in return for the extra trouble a valuable manure is obtained.

In many places such as Tinnevely and parts of Madura and Coimbatore, cultivators already pay special attention to the preservation of cattle manure. This is stored in pits, and at intervals of a week or more the manure is covered over with soil or tank silt. If the manure is too dry, it is even sometimes watered. If this soil or tank silt were replaced by a sandy soil which had been placed in the floor of the cattle-shed and allowed to absorb the urine of the cattle in the way described above, the ryot would be able to nearly double the value of his manure.

On the West Coast, there is, in the South Kanara district, already an excellent system of preserving both cattle manure and urine. The floor of the cattle-shed resembles a pit some three feet deep. The dung is not removed from this but is covered over daily with fresh jungle leaves and other fresh vegetable matter. This operation continues until the pit is full when the whole is emptied and either taken to the field or stored in a neatly made manure heap. It would be difficult to improve on this method, provided that the supply of jungle leaves is available, but in many cases this is not the case, and though it may be possible to maintain a supply of leaves and other fresh herbage during the rains, in the hot weather months this system of using dry earth as an absorbent for cattle urine might easily be adopted in places where jungle leaves have now become scarce.

In Malabar, where possible, the South Kanara system of using leaves as litter for the cattle should be adopted, but on the Sea Coast where leaves are not available, this dry earth method might be tried. There is great room for improvement in Malabar in the method of dealing with cattle manure. For several months in the year, this is in a semi-liquid condition and subject to all weathers, with the result that the most valuable manurial ingredients are washed away. This could easily be consolidated by mixing with it leaves, twigs, weeds and other vegetable growth which is so luxuriant during and after the monsoon, while the dry earth removed from the shed could be used to cover the dung, and in time it would become more or less incorporated with it.

In Tanjore and many other East Coast Districts one sees that often considerable trouble is taken to house the cattle, but that no attempt at all is made to conserve the urine. This is either allowed to soak into the solid floor of the shed or else is drained off into the village street, where it becomes a public nuisance. This dry earth method of conserving the urine as adopted in the Central Provinces and described above might very well find a place here, and would add much to the ryot's manure supply and consequently to the yield of his crops.

SERICULTURE.

Wild Silk Industry In South-Eastern Manchuria.

The *Journal of the Royal Society of Arts* says:—

The most interesting and important industries in the city of Antung, and perhaps throughout the whole of the district, are those connected with the various processes employed in the production of the so-called "wild silk." This silk, which in its reeled form is known commercially as "tussah," and when woven, as "pongee," has steadily grown in popularity both in the Far East and in America and Europe, and, thanks to successful experiments in dyeing, is destined in the future to be in even greater demand. Its tensile strength and beautiful natural golden brown colour are chiefly responsible for its popularity.

The silkworm is known to the Chinese as the shan-tsan or mountain silkworm, and scientifically has been variously classified by different authorities. Among the classifications given are *Antherea pernyi*, *Bombyx pernyi*, and *Bombyx fertoni*. Both in size and general appearance it is quite different from the silk-worm which produces the better known white silk. On maturity it varies in length from three to five inches, and is of a soft green colour, with tufts of reddish-brown hairs at different parts of its body.

While the white silk-worm must have the leaves of cultivated mulberry trees for its food, its less particular and more hardy northern cousin subsists on the leaves of several species of dwarf mountain oak which are native to eastern Manchuria, and grow uncultivated in great abundance on the sides of the otherwise rather unproductive hills that traverse this entire district. These trees serve the purposes of sericulture best when at a height of from five to six feet, and are accordingly kept from growing too tall by prunings made at intervals of several years. Where the natural groves are insufficient, recourse is had to artificial planting from seed. This, however, is a slow process, since from four to seven years' growth is required to produce a tree useful for feeding, and the trees are not at their best until they are from twelve to sixteen years old.

The cocoons used for propagation purposes are naturally selected from crops which have shown special quality. When it is about time for the butterflies to emerge, the cocoons are strung on cords and suspended in a quiet room. The opening through which egress is made is created by means of a secretion that dissolves the fibres at one end of the

cocoon. After their emergence the males and females are allowed to remain together for but one day, after which the former are released to fly where they will. The females are then taken to the place where it is desired that they should lay their eggs. In the spring this is in a basket filled with straw or twigs, and in the autumn, when the crop of leaves is ready for eating, direct to the oak trees. Each female lays an average of 150 eggs and is then released to spend the short remainder of her life where she sees fit. A period of from one to two weeks is required for the eggs to hatch. When there are indications that the spring crop of leaves will be late, hatching is retarded by means of exposing the eggs to the cold.

From the time of hatching to the commencement of the spinning of the cocoons a period of from forty to forty-five days elapses, during which the larva passes through five feeding and four sleeping phases, each transition being marked by the changing of the skin and an increase in size. The average time required for the spinning of the cocoon is from three to eight days.

According to a report by the United States Consul at Antung, the great fluctuations in the annual crops are occasioned principally by the many dangers to which the silkworm is exposed during the larva stage. The depredations of birds, stinging insects, and even of the ant, work great havoc at this time and require the most constant attendance if they are to be prevented. Fortunately, this is work that women and children can accomplish, thus releasing the men for the more arduous farm labour.

Two crops of cocoons, one in the spring and another in the autumn, are produced annually. The spring crop, which is put on the market early in July, is the smaller of the two and is used principally to produce eggs for the autumn crop, which is usually marketed after the middle of October. Cocoons are packed by the farmer in large woven willow baskets containing about 30,000. A basket freshly packed weighs approximately 400 lb. The weight, however, is reduced to about 270 lb. by the following spring owing to the shrivelling up of the chrysalides during the dry winter season.

The cocoons are transported to Antung, where they are stored in large walled or fenced enclosures and in warehouses until sold. Cocoons and spun silk are sold through large firms in Antung, who, through their familiarity with both the yearly production and with the market demands, are enabled to act as brokers, and to collect a commission for their services from both the seller and the producer. The purchasers, apart from the local filature owners, are chiefly representatives of filatures in Chefoo,

Shanghai and Japan, who go to Antung as soon as the season opens to secure their stocks.

While the production of wild cocoons is a common industry throughout the entire district, the main centres are situated in the south, with Kaiping (in Mukden district) in the west and Antung in the east as the most important. In both of these cities many filatures (factories in which the thread is reeled off from the cocoons) are situated.

Cocoons which are intended for reeling during the winter months may be stored in baskets with sufficient covering to keep out rain and snow. Those however, which it is intended to carry over to the following summer before using must have the chrysalides killed before spring, as otherwise when the weather becomes sufficiently warm the butterflies will develop and pierce the cocoons, thus partially spoiling them. The usual method of killing the chrysalides is by storing the cocoons in large warehouses capable of being heated, and in the midst of the extreme cold season raising the temperature to that of a spring day for a period of several days, after which it is lowered to that obtaining out of doors. When this process has been repeated several times all the chrysalides may safely be assumed to be dead and the cocoons carried over to summer with no danger of being pierced.

Cocoons are prepared for reeling by a process of steaming which serves to dissolve the secretion with which the component fibres have been fastened together. This process also kills the chrysalides in the case of the cocoons which have not been treated by the process just described. Steaming is done in large iron cauldrons sunk into brick stoves, which are usually placed in a room immediately adjoining that in which the reeling is to take place. The cauldron is first filled with a solution made by dissolving in water approximately six to eight ounces of soda for each thousand cocoons to be steamed, and after this mixture has been heated to the boiling point the cocoons are thrown in and rapidly stirred for several minutes. They are then dipped out and put into a round container not unlike a deep sieve in appearance, but with parallel strips of bamboo for a bottom, which is placed immediately over the cauldron so that the bamboo slates are only an inch or more above the surface of the boiling solution, and in this position are steamed for several hours.

When the process of steaming has been completed the inextricable mass of tangled fibres which form the outer covering of the cocoons, and which is known as *ta-wan-shu*, or "big waste," is removed; the innermost fibres which actually enwrap the chrysalides are hopelessly tangled, and are known as the *erh-wan-shu*, or "second waste." From its nature waste cannot be reeled, as is the thread, but

must be chopped up, combed, carded, and spun. Hitherto the waste has always been shipped to Europe for manufacture.

After the outer waste has been removed the cocoons are taken into the reeling room and distributed to the reel operators, who are usually arranged on high platforms running the length of a long narrow room, one operator to a reel. Each operator then gathers the ends of the fibres of from six to eight cocoons, twists them into a thread which he fastens to his reel, and by means of a treadle starts the reel revolving. As the thread passes through several rings before reaching the reel it is twisted and is wound on to the reel in the form of the finished thread. The reels are of two sizes, one with a diameter of $1\frac{1}{2}$ ft. and the other $2\frac{1}{2}$ ft. and in Antung are all operated by foot power.

The average capacity of an operator is from 700 to 900 cocoons a day, while the experts attain occasionally to 1,200. The skeins, which are usually some 4 ft. in circumference, are folded once and twisted spirally. The thread, when it has been manufactured into skeins in this manner, is known as "tussah."

The silk-producing qualities of the spring and autumn cocoons are different. One thousand spring cocoons will furnish from $5\frac{1}{2}$ oz. to 8 oz. of tussah, whereas the autumn cocoons yield from 8 oz. to 12 oz. The silk produced from the spring cocoons is of a softer and more pleasing texture than that from the later ones.

Tussah is classified by the Chinese trade into five grades, known as "extra," "No. 1," "No. 2," "No. 3," and "No. 4," according to quality. It is also divided into two general classes, "not filature" and "filature." The term "not filature" is applied to that reeled on a small scale in many different localities, and which as a result lacks uniformity, while "filature" is used to describe the product of the larger factories, which maintain standards of approximate uniformity.

Waste is commercially divided into two classes... No. 1 and No. 2...which correspond generally to the "big waste" and "second waste" already described. It is usually put up into bales of from two to three piculs ($26\frac{2}{3}$ lb. to 400 lb.)

The silk filature industry in Antung city is only twelve years old. In the year 1907 two small filatures were started, one under the auspices of the local Chinese officials, and employing 120 hands, and the other a small Japanese enterprise employing Chinese labour. The number of reels in one of the larger filatures ranges from 300 to 1200, and in the smaller ones from 25 to 100. In addition to these regular filatures a considerable amount of reeling is also done in private houses and as a sideline in other places of business.

Hitherto Chefoo has been the centre of both the reeling and weaving of wild silk, but in recent years the owners of filatures have steadily been moving their establishments to Antung. The change is a natural one, as it is cheaper to reel off the silk at the source of supply, and thus remove from the cost of production the items of transportation of cocoons and of duties levied by the Chinese customs. To this has now been added the further plan of moving the pongee weaving industry from Chefoo to Antung. In order to ensure success and to eliminate wasteful competition it is proposed that a single large weaving mill be established, the capital of which is to be contributed by the owners of the filatures.

A Japanese company, known as the Anto Yoko Manshu Kemmo Boseki Koba, has constructed a large factory in which it is proposed to spin silk "waste" into thread, and with this to weave various fabrics for the American and Japanese markets. The machines are to be of a variety especially suited for the purpose and are to be worked by electricity.

When the proposed large pongee weaving mill and the factory for the manufacture of the "waste" are put into operation, Antung will not only be the centre of cocoon production and "tussah" reeling, but of the final process of manufacture as well. As, comparatively speaking, only a small portion of the land in the Antung district suitable for growing scrub-oak is now so used, and since with the ever-increasing Chinese population there will be no possibility of a shortage of the necessary labour, the dimensions to which the industry can attain are limited solely by the world demand for tussah and pongee.

BEEKEEPING.

Importance of Personal Factor.

The following is from *Gleanings in Bee Culture*, for August, 1919.

To make a commercial success of beekeeping, not only are book knowledge and experience necessary, but also especial characteristics of the man. He will surely succeed if he has the adaptability, or what might be more specifically termed the beekeeping instinct. He must be industrious, active to details, possess some mechanical ability, or a close observer and something of a naturalist.

His industrious tendencies will impel him to build up his weak colonies and induce all his queen bees to reach the highest possibilities of reproduction of worker bees in time to avail himself of the full benefits of the honey flow. He will have a well-laid-out

workroom, and tools and equipment provided, with a view of accomplishing the maximum of results with the minimum of exertion. He should be familiar with ordinary mechanical tools, and be able to make necessary repairs to hives and other equipment.

He will know each variety of flower on which he depends for a crop of honey, when and how long it may be expected to bloom, and what are the probable effects of weather on it. He will know when the bees are preparing to swarm, and what measures to take to prevent or control swarming.

He will know the life history of the queen, the workers and the drones, and what are the functions of each, and a multitude of other details. In fact, a specialist beekeeper is sure to be a well-rounded intellectual man or woman, whether having had good educational opportunities and advantages or not; and let it be said in passing that the necessity of all these accomplishments in the successful beekeeper may be even as the reason for the higher average of his intelligence.

Some men have the beekeeping instinct so highly developed that any time they may devote to other money-making activities is against their financial success. As an illustration, a beekeeper of New York State, who enjoys an international reputation for his success as a beekeeper, and who inherited a valuable farm of some 200 acres, maintains that he would have been better off financially if, he had given the farm away when he inherited it, and had devoted himself exclusively to beekeeping instead of dividing his time and attention between the farm and the bees.

The Best Strains of Bees Needed.—To reach the highest measure of success in any occupation, the best means to attain the desired end must be employed. The farmer specializes in the crops best suited to his soil and climate; the horticulturist, with those varieties of fruit that reach the highest perfection in his locality; and the Live Stock specialist, with the breeds of stock best adapted to his purpose. The beekeeper is no exception to this rule. To realize the highest percentage of profit, the best strains of bees must be employed—those that are markedly industrious; that resist disease; that winter well; that are gentle, and easy to manipulate; and, if comb honey is to be produced, bees that cap the honey white.

How Best to Gain Experience.—The prospective beekeeper should not allow his order to get the best of his judgment. Too much haste is not speed in acquiring proficiency, and in making beekeeping a commercial success. One way to learn the business is to commence with not to exceed five colonies, and

with these, put into practice the theories and practical directions that are obtainable from text-books, bee periodicals and Government bulletins on beekeeping. When the would-be beekeeper learns by practical experience that he can manage a few colonies profitably he can enlarge the business at will and with success assured.

If he desires to become well qualified in as short a time as possible to produce honey in quantity, there is no better way than to engage in the work with a specialist for at least one season. This practical experience will decide whether the student possesses the essential natural qualifications. Also a knowledge of desirable equipment of hives and devices, and how properly to use them, will have been secured, which will prove to be of great value to the beginner.

Danger of Overstocking.—In establishing an apiary, due regard should be had for the moral rights of other beekeepers already established. If a beekeeper is occupying a location with as many bees as it will profitably support, a due observance of professional ethics would deter another from occupying practically the same location. The beekeeper who encroaches on a well-stocked location will necessarily have to put up with much smaller crops of honey than he would if he placed his bees in unoccupied territory. Self-interest ought to be sufficient incentive to prevent overstocking.

Easy to Succeed.—Beekeeping as an occupation has developed rapidly from an avocation to the dignity of a vocation, and all within the past sixty years. Within the memory of many veteran beekeepers, the activity of the apiarist, with few exceptions, was confined to the one home apiary; now specialists with a string of apiaries are common. Within that time the most valuable sides to commercial beekeeping have been invented and brought into common use. Without these the high degree of success attained would have been impossible. Sixty years ago there was not a factory of importance that made us speciality of beekeepers' supplies. At the present time there are numerous well-known houses turning out vast quantities of material for the use of the beekeeper that reach into every quarter of the globe. The science of beekeeping is also enriched by several high-class trade journals, and many books and Government bulletins. Indeed, the cumulative knowledge of the science that is now available is so abundant that, to become proficient, and make beekeeping pay is comparatively easy in these later years.

THREE APIARIES, EACH OF 50 COLONIES.

The Board of Agriculture for Scotland has approved of the following scheme to assist Scotland beekeepers in restocking :—

Three apiaries—one for each College—each apiary to contain 50 colonies.

Each College will have to appoint an experienced beekeeper apiarist.

The stocking of the apiaries should be entrusted to the lecturers, who would use their discretion as to the type or strain of bees to be bred and supplied to beekeepers.

Nucleus stocks with fertile queens would be sold to beekeepers at a uniform price of 10s. per comb. It would not be wise to send out any nuclei before season 1920.

All reasonable care would be taken to purchase stock likely to be disease-resisting, and increase would be made only from healthy stocks.

The estimated cost of the scheme (for each College separately) is:—

CAPITAL EXPENDITURE.

50 Bee hives at £ 2 each	... £ 100
50 Stocks of bees at £4 each	... 200
Frames, foundation, and appliances.	60
Nucleus boxes and other expenses	40
	£400

ANNUAL EXPENDITURE.

Salary of apiarist at 50s. per week	... £ 130
Sugar, carriage, and sundries	... 20
	£150

BOOKS IN BRIEF.

The Real Wealth of Nations.—By J. S. Hecht, F. R. Econ. S. Published by Messrs. G. G. Harrap & Co., Ltd., London. 15sh. net.

This is an eminently suggestive volume. It is devoted to the causes which have contributed to the present position in the industrial world. What is the present slackness due to? Why do the working classes proclaim that restriction of output benefits them? Are they the only party to blame in the matter? What are the false theories underlying the present industrial unrest? Mr. Hecht tackles these and other kindred problems in a serious spirit. His aim is to convince the workers the value to themselves of maximum production. The arguments put forward in this book are that of a scholar and require careful consideration. For one thing, Mr. Hecht is not afraid to state his views boldly. He is critical both of free Traders and Tariff Reformers. Speaking of Bolshevism, he remarks that "it is not a Russian menace, but the logical outcome of the teachings of the Victorian Economists." The constructive part of the book is its last chapter, entitled "A New System of Government." It shows in brief compass what serious people think of the present position. In Mr. Hecht's scheme of Government, production, exchange and distribution of wealth will be controlled by its producers, and it being possible to recognize the value of each individual to the community, his reward will be decided in accordance with his deserts and the standard of altruistic education of the community. Only thus, in his opinion, wealth and contentment are simultaneously attainable. This is a book to read for its plain-spokenness is writ large on it.

Indian Hides and Skins.—(John Murray, London.)

In 1916 the Secretary of State for India authorised the Committee for India of the Imperial Institute, of which Sir Charles McLeod is Chairman, to conduct an enquiry into the possibilities of increasing the trade in Indian raw materials with the United Kingdom and elsewhere in the Empire. Special Committees, including commercial experts, were formed to deal with various materials. The reports of these Committees, which contain important information and recommendations regarding the extension of the industrial utilization of Indian raw materials, are in course of publication as a series of volumes by Mr. John Murray. The first volume, relating to Indian Hides and Skins, which has just been issued, contains the Reports of the Hides and Tanning Materials Committee on cowhides (kips), buffalo hides, and goat and sheep skins, and also a detailed account of the trade in Indian hides and skins. The most important of these products are kips and goat skins. Before the war the value of the annual exports of kips from India was about £4,000,000, whilst goat skins to the value of over £2,000,000 were annually exported and in addition over £1,000,000 worth of tanned goat skins. The annual values of the buffalo hides and sheep skins exported from India before the war were about £1,500,000 and £900,000 respectively. At one time

a large proportion of the exports of raw Indian kips was tanned in this country, but subsequently both the tanning of the hides and the export trade from Calcutta gradually passed into German hands. In 1913-14, the value of the kips exported to Germany amounted to £2,000,000 and to Austria £750,000, whilst those shipped to this country had a value of only £63,000. The Report deals with the measures necessary to recover this important trade and to keep it in British hands, and recommendations are made as to the necessary conditions for re-establishing the tanning of Indian-kips on a large scale in this country. One of the principal recommendations was the imposition in India of an export duty on the kips, with a rebate to tanners within the British Empire, and this measure has since been adopted by the Government of India and is now in force. The Committee also favour increased tannage in India. Most of the goat skins exported from India are shipped to the United States where they are tanned by the chrome process for the production of glace kid, which is largely sent to this country. It is believed that a great extension of chrome tanning here and throughout the Empire is possible as large quantities of raw goat skins are available in India and other British Possessions. The fact that a preferential export duty on raw goat skins, similar to that on kips, has now been imposed by the Government of India should contribute to this end. Before the war goat skins tanned in India were largely shipped to London for disposal, but the leather was mostly utilized in foreign countries for the manufacture of fancy articles, which in turn came back to this country.

Ancient Indian Education. By Rev. F. E. Keay, M. A. Published by the Oxford University Press.

This is an inquiry into the origin, development and ideals of Indian education. Great praise is due to this attempt, for the field is new and the workers have been practically *nil*. In the preface to the volume, Mr. Keay rightly says:—"If a system is to be evolved for India which shall be truly Indian, it must, while assimilating much that is Western, also gather up what is best and most useful from its own ancient systems and weave them into the complex whole that is being built up. For this reason the study of ancient Indian education is most important and deserving of far more attention than it has hitherto received." Mr. Keay's own contribution to this study is, we are glad to say, a solid one. The scope of the volume may be gathered from the chapters which form it: Brahmanic Education, Education of Special Classes, Buddhist Education, Mohamadan Education, Popular Elementary Education, and Some General Conclusions. Mr. Keay concludes his little volume with these words:—"The future of India lies in its children, and this land, with its vast population, presents a wonderful opportunity as well as a huge responsibility to its educators. There are, and will no doubt always be, many controversies with regard to the most desirable development that its educational system shall take; but it is to be hoped that there will arise therefrom a system which, while incorporating new and old, will transcend both in its practice as well as in its ideals." So be it, we would add.

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FINANCING OF BUILDING SOCIETIES.

BY THE EDITOR.

THE question of housing has been of late attracting considerable attention in India. Opinion is now unanimous that Government's responsibility in the matter of housing is one that cannot be avoided. The suggestion has been put forward that the requisite money may be found by the Government from its general revenues and that it may be lent by them to Co-operative Banks for being made available, on certain conditions, to Building Societies founded and run on co-operative lines. Some authorities consider that the question of housing should be handled only by Building Societies, whether worked by Co-operative institutions or by Joint-stock concerns it does not matter much. They object to municipal institutions undertaking housing work. A recent Report issued in Canada, where a committee studied the question in all its bearings, supports this view. It suggests that municipalities should do no more than provide the facilities for construction work. This duty in fact reduces itself in most cases to creating the amenities required for housing work to commence in any given area. These include in its opinion, the surveying of land, the laying out of roads, the marking of sites, the providing for drains, &c. &c. If municipalities do this part of the work for which they are best fitted,

Building Societies would next step in and do the rest. Whether this view is accepted or not, and there is much to be said in its favor even in this country where the conditions are somewhat different from Canada, there can be no question that some active steps are necessary to promote building operations. The need for increased accommodation in urban areas is keenly felt by large classes of the population and a careful threshing out of the problem is necessary. It is a question if the housing of the poorest may not be considered as a problem by itself in large towns, where there is a large floating population dependent for its maintenance on particular industrial ventures. It seems necessary to bring home to these the duty incumbent on them for providing suitable living accommodation. This is the more necessary because it is this part of the population, living practically in the roads and lanes of large cities, that are most easily affected by diseases of various kinds and they unwittingly become the source of much danger to the rest of the people. That, however, is only one aspect of the question, though by no means an unimportant one.

The question of providing housing for the poorest of other kinds, including in this category those making their living from sundry trades and callings, is a more difficult one. For the men they work under cannot be expected to provide for them while they themselves are too poor to build or own houses. To these, particular attention deserves to be paid for they form at present

the majority of the people without facilities for housing themselves. In the case of these, it is our firm conviction, Building Co-operative Societies of a particular kind can do much good. Of a particular kind we say advisedly because large societies for building purposes are not likely to prove successful. They cannot also be easily financed. Supervision would prove difficult. And then it would be impossible to build simultaneously all the plots and complete the work within a given time. Experience shows that small and compact societies with a membership of forty or so, stand the best chance. A federation of such societies would be a consummation to be devoutly desired. Such a Federation would help in the wholesale purchase and manufacture of various articles required for house building purposes. Expert advice and guidance could also be arranged by a Federation more easily than by individual Societies. Such a Federation would also enable the Department of Co-operation to render more effectual aid in regard to finance and kindred matters.

• A similar plan would help towards the solution of the housing difficulties experienced by the poorer middle-class. What might be done for this is illustrated by at least one Society working in Bangalore City, which in a short time has enabled as many as forty people to build their own houses under its guidance and help. Similar Societies could easily do more, provided the Government and the Municipality concerned came to their active aid and managed housing operations through them. The initial cost of land purchase may in that case be reduced very considerably and those who now lock up their money in sites would be enabled to actually build. The Government would get a ground rent, possibly subject to revision once every 20 or 30 years and the Municipality a building assessment, subject as now to periodical revision. Both Government and people stand to gain by this mode of operations rather than by sale to the

highest bidder --who often is moved to purchase to make a profit in the near future. The question is one well worth serious consideration and we should be glad to see it taken up by those interested in the subject.

We have left ourselves little space to consider the possibilities of Building Societies on the joint-stock plan. These have done much useful work in foreign countries and there is no reason why they should not succeed here. Under suitable management they ought to do well. In Bombay and Karachi, this work has been taken up in earnest by local people forming into joint-stock companies. Such companies can do much in a town like Bangalore, where there is so much still to be done to provide housing facilities for a growing population. Suburban areas can be opened by them with greater ease than by small Co-operative Societies and the railways that radiate from Bangalore can provide for the transit of the residents of such areas. This also deserves close examination.

A great deal, however, depends on the capacity to finance undertakings of this kind. Joint-stock companies may find their own capital but Co-operative Building Societies have to depend to a large extent, in the present circumstances, on Government aid. Banking is still undeveloped in this country and money got on the terms of a short-term deposit can hardly be invested in long-term loans. And Building Societies generally cannot do without long-term loans. In fact, the builder of a house on this plan should not be expected to pay as a monthly instalment on his whole loan more than what he would ordinarily pay as rent for thirty days for a house he might be expected with reason to occupy. The question as to how far Government can afford to lock up its money to an increasing extent on long-term loans for housing purposes has also to be carefully considered. No doubt Government's duty to its people is great. No doubt also that it must do sometimes what Banks cannot or

will not do. Still ways and means have to be considered. This being so, it is desirable to find a way out for Government. Even where its duty to act in a particular case is clear, Government is likely to lag behind if it cannot easily hit off a suitable plan of operations. If we concede that the existing number of houses are insufficient and that house building cannot keep pace with the requirements of the people, it follows that house building cannot be pushed through rapidly, or even proportionately to the needs of the country, without Government intervention. That Government can and should intervene is also conceded. What it should do is matter for consideration. It can help the Building or Housing Societies which work on principles other than those indicated by the term "Joint-stock." The sort of societies which can be worked on a co-operative basis come under this head. Government would do well to consider the possibilities of a scheme for rendering financial aid to these Societies. As it may not be possible to find means to do this from general revenues, Government may, following the precedent of Western countries in this matter, seek a new source to tap for the required money. Now that house property in towns—for example, Bangalore—is passing into the hands of the richer classes and there has been a general rise in the value of both sites and houses, there is no reason why Government should not get a portion of the increment in the rent charged by landlords for houses or sites used for any kind of purpose. There is the greater reason to do this for the Government has by its grants to towns of this type increased its expenditure on them at the cost of the general tax-payer. It is necessary, therefore, that the general tax-payer should not be further taxed to make it the more comfortable for the rich man who invests in houses and in building sites to become richer. To relieve the general tax-payer from the burden of providing for further accommodation and to put a certain

amount of responsibility on the owners of buildings who benefit now from the general rise in the rents paid, it might be useful to bring into existence what is known in certain countries, for instance Sweden, as an "Increased Rent Value Tax" in the form of an extraordinary temporary taxation of the increased net income from rents. The total amount collected in a year under this head may go to form the House-Building Fund of the State from which subventions to building Co-operative Societies, organized on definite lines and with definite programmes of work, may be made. The total subvention may be fixed for each year and made known to the Societies concerned. The demand on the fund for any year would not in that case exceed the amount set apart for the purpose for the year. Subventions to societies may take the form of (1) a loan free of interest for ten years, (2) a direct capital subvention up to 20 per cent of the cost of building, or (3) a loan ranging to 32 years with a nominal rate of interest, calculated on the basis of the up-keep of the Fund. Discretion may be allowed to combine in any case forms (2) and (3). The Fund itself would be worked by Government, though there is no reason why an Advisory Board of officials and non-officials should not be attached to it. The Fund should be kept apart from other Revenues, and administered by Government as a public trust would be. The amount to which it should be raised depends on the demands likely to be made on it. This can be worked out without difficulty if the general principle involved in its maintenance is approved. The tax which is to feed it would be collected by the Municipalities concerned with the assessments and credited to Government accounts. Government may invest it or pay a small interest on it. The net rental value on any building would, for purposes of collection, be obtained by deducting the interests on the debts, if any, of the property, incidental expenses, repairs, insurances, consumption

of water, etc., calculated at a certain rate (usually $2\frac{1}{2}$ p. c.) for brick or stone houses and at a slightly higher rate (say 3 p. c.) for buildings of other materials. To avoid the tax becoming a burden on the owners of small houses, it need not be levied on houses the increased value of which does not amount to Rupees five hundred. A graduation in the tax may also be adopted, limiting the tax to 15 p. c. on houses the increased value of which does not exceed Rs. 800, and 25 p. c. for those exceeding Rs. 800.

The need for a Fund of this kind will be obvious to any one who remembers the demand for new houses in the bigger towns. There is a limit, as we have said, up to which Government can go with its limited Revenue. If more is demanded of it, new sources of revenue have to be pointed out to it. It is only then that it can be induced to take up the question. A tax of the kind proposed above is no injustice to house owners as they pay only on the increased values obtaining for their properties as the result of Government's own activities in the areas in which they are situate. Government creates the amenities and Government, therefore, is entitled to a portion of the unearned increment which now goes into the pockets of private owners.

A contemporary states that an important deposit of iron ore has been discovered in Morocco between the river El Abid and the Robia, in the neighbourhood of El Bourdoudj. The deposit is said to be on the surface of the ground, and to contain some hundred millions of tons of rich ore. Its development will be facilitated by the fact that power for driving machinery can be obtained from the river El Abid, and the transport problem will be solved by the construction of the railway which is to be built to connect the phosphate deposits at El Bourdoudj with the port of Casablanca.

INDIA THREE HUNDRED YEARS AGO.*

BY GILBERT SLATER, M.A., D.Sc.,

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BY the publication of this book Mr. Moreland has earned the sincere gratitude of students of Indian economics. It is scholarly, painstaking, and thorough in research, lucid in exposition of the results of research, and what is even more important, the evidence is weighed with a thoroughly judicious spirit. My own feeling after perusal is that at last a real, substantial beginning has been made in the writing of the economic history of India, and that at one and the same time a model worthy of imitation has been set before future writers, and a sound foundation laid on which future additions can be safely built.

Students of English economic history have been fortunate in having, in the Domesday Book, that tax-collector's survey of every inhabited village prepared by the orders of the Norman conqueror, a starting point from which to push their enquiries both forwards towards the present, and backwards into the remote past. And the value of Domesday is enhanced by the fact that it was compiled at the end of one political era and the beginning of another. So also for India, there is in the Ain-i-Akbari a survey of much of Northern India made under somewhat similar circumstances as Domesday, though failing to yield the same minute detail, and not yet exposed to the searching examination which great numbers of students have devoted to its English analogue. And the date of the Ain-i-Akbari, being also approximately the date of the coming of the East India Company to India, may well be

* *India at the Death of Akbar*, by N. H. Moreland, C.S.I., C.I.E., Macmillan & Co. 1920. 12s. net.

regarded as marking the beginning of a definite era in Indian history. Hence the investigation of India's economic condition at that date is specially hopeful from the point of view of attaining trustworthy results, and specially useful as a necessary preliminary to the study of the three centuries during which the destinies of India and Britain have been linked together.

The India which Mr. Moreland treats of is the modern Indian Empire without Burma. Politically it consisted of the Mogul Empire in the north, the disintegrating remains of the Empire of Vijayanagar, and various Moslem Kingdoms on the tableland of the Deccan. On the coast the Portuguese were established at the mouth of the Indus, they held the fortified posts of Diu and Daman on the two sides of the opening of the Gulf of Cambay, while their main stations were Goa, Calicut and Cochin. With other fortified posts at Ormuz and Colombo, and their important settlements in Africa, they endeavoured to control not only the whole of the trade between India and Europe, but also that between India and the far East, and even Indian coasting trade. The Dutch were on the eve of establishing themselves at Masulipatam. But no foreign power, unless the Moguls be considered foreigners, held any considerable power on land.

Mr. Moreland endeavours to form a rough estimate of the population of this vast district by some very ingenious calculations based, for North India, on the extent of cultivation reduced from the statistics in the *Ain-i-Akbari*, and for South India, from the information which has come down to us with regard to the strength of the armies of the Vijayanagar Empire. He comes to the conclusion that some parts of India were already very fully populated, but that many parts which now have a dense population, such as South and West Punjab, the United Provinces, North and East of the Gogra, and Bihar, were very sparsely occupied.

His gross estimate for the total is one hundred millions, and he does not think that any Indian city had a greater population than half a million.

From the economic point of view Mr. Moreland classifies this population according to whether the economic importance of each section lay in their activities as producers or consumers. Under the former head he puts the classes engaged in (1) Agriculture, (2) Manufacture, and (3) Commerce. Under the latter (1) the Court and Governmental Service, (2) the professional and religious classes, including mendicants and ascetics, and (3) domestic servants and slaves.

In all essential respects agricultural production was carried on much as at present. The most important changes that have taken place are the introduction of some new profitable crops, such as ground-nuts, and the expansion in the demand and production of others, such as jute, and the transformation of certain districts by irrigation works. All these tend to a larger production per head of rural population; but, on the other hand, there may be some decrease in the average fertility of the soil under cultivation, through increase of population, and consequent extension of cultivation into new land, which is, presumably, on the average somewhat less fertile than that which was already tilled at the end of the sixteenth century. But again, we have to allow, on the other side, for the indirect advantages the cultivating class has gained from the improvement in the means of communication. Tools and implements have altered but little. The peasant to-day can get iron on more favourable terms, but probably has to pay more dearly for his working cattle. Hence it is hard to say whether the agricultural production per cultivated acre, or per agricultural family, has increased or decreased, but it is improbable that there has been any important change in either direction.

On the other hand there has been an important change in the distribution of the income won from the soil. Akbar's revenue drawn from any particular description of land was about four times as much as that now drawn by the State from the same land, reckoned in grain values. Hence the income left to the enjoyment of the peasant must have been considerably less under Akbar than now, while the advantages he derived from the Mogul Government consisted only of a very imperfect protection of life and property. The fluctuations of price in the local markets, in the absence of such restraining influences as railway communication, were undoubtedly very great, and the peasant, as a seller, was probably even more at the mercy of the trader than at present. On the other hand the trading classes had to carry on their activities in the face of great difficulties from the imperfection of the roads, and of dangers from dacoits, and therefore required very large margins between buying and selling prices in order to carry on their business continuously. In social status the actual workers were somewhat more depressed than now, as slavery was not uncommon, and those in a condition of serfdom, like the *padiyals* of to-day, were very numerous. And behind this somewhat hard condition of life there was the continual fear of starvation, resulting either from failure of rain, or from the ravages of war. Mr. Moreland dwells upon the change in the very significance of the word "famine." "A famine is now a period when distress is such as to require the intervention of the State, but if we were to rely upon the chroniclers of the sixteenth century, we should define it as a period when men and women were driven by hunger to eat human flesh. Badaoni wrote as follows of the famine of 1555: 'the author with his own eyes witnessed the fact that men ate their own kind, and the appearance of the famished sufferers was so hideous that one could scarcely look upon them. What with

the scarcity of rain, the famine and the desolation, and what with uninterrupted warfare for two years, the whole country was a desert and no husbandmen remained to till the ground.' Of the same period Abul Fazl wrote that 'men were driven to the extremity of eating each other,' and of the later famine of 1596, we are told again that men ate their own kind, and that the streets and roads were blocked up with dead bodies." (pp. 127-8).

Of minerals the most important were copper, iron, salt and diamonds. Coal was not mined, and gold and silver were obtained, otherwise than by import, only in very small quantities. Copper was obtained in Rajputana, and some other districts, but not in large quantities, and it was very costly, and goods made of copper and brass were expensive luxuries inaccessible to the great mass of the population. Iron was produced in much larger quantities, and in many parts of the country, but its price, reckoned in grain, was about three times as high as in 1914, and the metal had to be used with great economy.

By far the most important of all Indian manufacturing industries was that of cotton. Cotton was not grown as intensively in particular districts as now, but the plant was even more widely diffused. The Indian manufacturer not only had a monopoly of the home market, but also carried on a considerable export trade, and a Portuguese observation has been put on record that "every one from the Cape of Good Hope to China, man and woman, is clothed from head to foot in the products of Indian looms." But this observation must be understood with the limiting clause "in so far as they are clothed at all," for between the Cape of Good Hope and India the great mass of the inhabitants wore no clothing at all, and even in India the testimony of travellers is to the effect that the majority, at any rate of the men, possessed no clothing except a loin cloth. The Gulf of Cambay was the

centre of the largest export trade, collecting cloth from far in the interior, and sending it to Africa, Arabia and the Persian Gulf, and even to Malacca and China. Bengal and the Coromandel coast also produced cotton goods for export, chiefly to the Spice Islands and the Malay Peninsula.

Silk weaving was of some importance, Gujarat being the chief seat of manufacture, but here foreign competition was of importance, for the nobles on whose patronage the trade depended were avid of novelties, and silk goods are valuable enough to pay heavy transportation prices if they find a good market at the end of the journey. It so happens that there are materials for forming comparatively close estimate of the total output of this manufacture, and Mr. Moreland puts the total consumption of raw silk by Indian spinners and weavers at 3,000,000 lbs. of which about half a million pounds was imported. Since the pre-war consumption was about 4,000,000 lbs. it would appear that Indian silk manufacture has grown in actual volume but diminished relatively to the population. Jute appears to have been used pretty extensively for the manufacture of coarse clothing in Bengal. Other manufacturing industries and handicrafts were practised with much skill and in great variety in the various capitals, in order to meet the demands of ostentatious courtiers; but none of these was of any great economic importance.

The system of administration was somewhat different within Akbar's Empire from that in the independent kingdoms. In both a system of division into districts obtained; but while in the South each district was under the charge of a single officer who had to maintain a certain military force, and pay into the State Treasury a fixed annual sum, and beyond this was allowed to much as he liked and enrich himself as much as he could; on the other hand within the Mogul Empire a district had as a rule two officers, a military officer as well as a revenue officer,

and they were paid fixed salaries, and had to account to the Imperial Treasury for all the moneys received in taxation. The salaries received by the higher officials of Akbar's Civil Service ranged from about 1,000 to 20,000 rupees per month, but it has to be remembered that the rupee of that time had about five or six times the purchasing power of that of the rupee of 1910--2, that is, at least ten times the purchasing power of the rupee of 1920. Hence under Akbar an officer of the rank of a member of the Executive Council received the equivalent of about *two lakhs of rupees*, of to-day *per month*! Almost all of these highly paid public servants were foreigners, and they owed their promotion to the Emperor's favour, obtained possibly by impressing him with their executive ability through some happy chance, and possibly by skilful flattery. Naturally the quest for Imperial favour was an intense gamble. One of Akbar's officers who started in life as a slave when he died left a fortune equivalent to a crore of rupees at pre-war values. But the number of disappointed and unsuccessful gamblers was, no doubt, in proportion to the richness of the prizes that attracted them. And the service was subject to the drawback that neither rank nor fortune could be passed on by the lucky individuals to their descendants, for the Emperor was the heir to all his officers. Hence though they might build up secret hoards for the benefit of their children in the hope that these might escape the vigilance of the tax collector, they were largely deprived of any motive for thrift, and the enormous salaries of the Emperor's favoured courtiers were spent lavishly.

Hence Akbar's court was extraordinarily luxurious and extravagant. The Imperial Zanana contained more than 5,000 ladies, each of whom had separate apartments; they were attended by a great staff of servants, and encircled by (1) female guards, (2) eunuchs, (3) Rajputs, (4) porters at the gates and troops all round the buildings.

Wherever the Emperor was, water was brought to him daily from the Ganges, ice from the Snow mountains, fruit from Kashmir, Afghanistan and even Turkestan. This pomp was imitated by the courtiers in proportion to their means; and Golconda, Bijapur, Vijayanagar, Calicut, and even Goa, imitated the splendour of Agra or Delhi in a smaller scale. Vast numbers of the innumerable attendants who ministered to this display were either miserably paid free men, or even slaves; and slaves in India were both abundant and cheap. Some were imported from Africa, but the great majority were natives of the country, and of slaves of local origin the supply did not fail, as in the extremity of distress caused either by failure of rain or by war or by the oppression and extortion practised by the more greedy and unscrupulous of provincial governors, parents were glad to sell their children as slaves to save their lives.

The above is in broad outline the picture of Indian Society as Mr. Moreland has been able to piece it together from contemporary observation and record. For the peasantry and craftsmen below, and the courtiers above made up Indian Society. The middle-class was practically non-existent.

It is very interesting that this book should have appeared in the very year in which the British rule in India has begun to give place to Indian self-government. For it enables us to summarise the successes and failures of British administration.

In making our estimate we must remember that the period intervening between the death of Akbar and the time when the authority of the East India Company became paramount, is about two centuries, and the period from then till now about one century. The earlier two centuries were the time of the decay and breaking up of the Mogul Empire, and they were marked by increasing disorder, warfare, social disintegration and economic deterioration. The first task, therefore, of the British in India during the

last century may be said to have been the restoration of the degree of political efficiency and economic prosperity as existed under the last years of Akbar's reign. In this they have succeeded.

Their second task was to establish order and security of life and property and freedom of communications throughout India, to a far higher degree than had been attained even under Akbar. In this also they have succeeded.

Their third task was to cope with the recurring famines due to natural causes, and to convert the significance of famine from a time of widespread death by starvation and even cannibalism, into merely a time of famine works and gratuitous relief. In this they have succeeded.

Their fourth task was to create railways, roads, and irrigation works. In this they have done great things.

Their fifth task was by diffusion of education to make India a participator in the intellectual life of the world, and hence to give India national self-consciousness, and the capacity for self-government. How far they have succeeded in this, time will show.

Their last task the British administration was just beginning to recognise as its duty, but as more difficult duty than any of the preceding, when the decision came that the main responsibility for this service must be assumed by an Indian electorate and a representative system. That is the duty of lifting up the economic status of the ordinary Indian manual worker, whether peasant, agricultural labourer, or urban worker, above his traditional standard of a very bare subsistence.

In the above brief summary of the results of Mr. Moreland's investigations I have emphasized rather the points in which Akbar's India differs from India of to-day. But in so doing I have not conveyed the strongest impression which his book makes on my own mind. What in it strikes me most is the idea it conveys that for the labouring masses in India life is now, apart from the removal of fear of certain special

calamities, very much what it was three hundred years ago. The dominant economic fact then is the dominant fact now. And that is the fact that the Indian birth-rate is very high, and the Indian rate of industrial progress very low, so that if the death-rate were as moderate as it would probably be if the mass of the population were prosperous, there would be an annual addition to the population of India of some six millions human beings, with little chance of sufficient remunerative employment for these newcomers. In other words the Malthusian theory of population applies to India. This fact is a good deal disguised by the publication of Governmental statistics of births and deaths without any warning to the reader that registration is very imperfect. A comparison between the census returns and the registration figures shows that the Indian birth-rate cannot be far short of 50 per thousand, and the total annual births must be somewhere in the neighbourhood of sixteen millions. In other words the number of annual *births* in India is about equal to the united *populations* of Canada and Australia!

To lift the mass of the Indian population out of its condition of poverty, *either* there must be so rapid a development of the productive powers of Indian agricultural and non-agriculture industry as to permit, at one and the same time, a tremendous increase of population and a substantial increase in the incomes of the labouring people, *or* there must be a radical change in the customs of the people with regard to marriage and parentage. The difficulty of effecting either of these changes is enormous. But neither is outside the range of possibility. Each of them demands the same psychological development as a preliminary. The average Indian of all classes must regulate his life more by calculation and forethought, and rebel more against his life being controlled for him by traditional habits, customs, beliefs and obligations, or by unrestrained natural instinct. It may well be that such a break with tradition, and such a painful intellectual development will be deemed too high a price to pay for escape from poverty; but the price, however high, is necessary; and if it be refused, the only alternative is for India to accept for future centuries a continuance of poverty.

We Britons may well be glad that the responsibility for making this decision will rest upon India herself, and not upon us.

SURVEY OF THE GERMAN IRON AND STEEL INDUSTRY.*

BY C. J. KAVANAGH,

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THE following is a comparison of the present position with pre-war years, indicating how the re-grouping of interests, is going on in Germany in the iron and steel industry. This article should prove of special interest to all those who are interested in the iron and steel industry in this country.—Ed., M. E. J.]

A review of the present position of the German iron and steel industry is of interest to the iron and steel producers and manufacturers in the British Empire, in view of the altered conditions under which Germany now manufactures.

The cession of Lorraine and the new status of Luxemburg and the Saar Basin has altered Germany's manufacturing capacity, and British interests must be placed in a position to judge the extent of the competitive role which Germany will be competent to play in the future.

It is not yet possible to deal with the subject on any but the most general lines, as the position, outside of the net losses to Germany, is still in a state of flux, and many months must elapse before there is any definite clarity in the situation. A general survey at the present time should, however, be of assistance to Empire interests in enabling them to anticipate Germany's future importance as an iron and steel producer. New factors in the industry also deserve the closest attention—that is, the possible effect on output of the transference of German establishments to French control; again, to what extent an agreement on a working basis

*With acknowledgments to the *Board of Trade Journal*.

may be formed between French and German interests; and finally, in view of American participation in the Allgemeine Elektricitäts-Gesellschaft to what extent some co-operation from that side with the German smelting and refining industry may be attempted.

GENERAL POSITION.

The shifting of the centre of gravity of iron and steel production from German to French hands deprives Germany to a very great extent of her control of essential raw materials, and will have a far reaching effect, not only on her steel industry, but on her vast complexity of engineering and allied trades, including shipbuilding, which she had built up under previous conditions. The net annual losses in steel production with which she is faced through loss of control of Lorraine, Luxemburg and the Saar, are but little short of her previous exports of iron and steel goods, including rolling mill products and machines, and amount to about $5\frac{3}{4}$ million tons.

It is estimated that about one-half of the pre-war iron and steel output of Germany was worked up into some form or other of export articles, and represented about 20 per cent of the total value of exports.

Germany's importance as a steel producer was founded chiefly on the Lorraine resources of minette ore, the efficient exploitation of which led to the mass production which made itself very keenly felt in the outside market, not only in steel, but in almost every class of engineering product. The ceded portion of Lorraine was responsible for 75 per cent of the total German pre-war production of ores, whereas Lorraine and Luxemburg together supplied above 79 per cent of the whole ore production expressed in iron content. There were in 1913, in Lorraine 65 blast furnaces, producing nearly 4 million tons of iron; or 20 per cent of the whole German production, and it is estimated that the total invested capital in pre-war values ranged from between 500 to 600 million marks. Further, Lorraine ores fed the Saar works,

and in addition supplied about 15 per cent of Rhineland-Westphalian requirements.

In latter years German industry was attracted to Lorraine and the Saar by the advantages offered by proximity to the ore fields, and many of their most modern works were established there, besides which she had further begun a penetration into the French minette fields, and acquired interests also in Normandy.

In Lorraine an impetus has been given to mild-steel production by technical developments in the utilization of waste gases from blast furnaces, and the importance of this district as a producing centre is likely to increase under the altered conditions. What developments are likely to take place in respect of the relationship of German works in the Rhineland to French interest it is difficult to foretell and will depend largely upon the course of agreement with France.

The competition which Rhineland-Westphalia and the remaining German works will have to face from the Lorraine, Luxemburg and Saar steel works, with their modern equipment, and other economic advantages, will be felt very keenly.

The Saar blast furnaces produced about 7 per cent of the total German production of pig-iron, and the importance of this district as a coal producer gave her a very strong position, her coal output in 1913 amounting to some 17 million tons, and representing about $9\frac{1}{2}$ per cent of the total German output.

In raw steel the production of the Saar Basin was greater still than the pig-iron output, and amounted to nearly 12 per cent of the whole 1913 German total, and to this end drew supplies of pig-iron from Lorraine and Luxemburg.

In Luxemburg there were 41 blast furnaces, the interests in the smelting and refining industry being predominantly German.

PIG-IRON.

Germany, in pig-iron production alone, occupied, with a capacity of 19.3 million

tons, second place to America, and her production exceeded that of the United Kingdom by about 8'7 million tons. Her present capacity as a pig-iron producer, were she working on full output, which she is not owing to the great shortage of coal and ores, would approximately place her on a level with the United Kingdom, while France will occupy second place on the list; and a Franco-Luxemburg-Belgian combination prove very formidable when normal conditions of working return. That some attempt at syndication in this direction will be made is certain, especially with the profitable example afforded of the working and results of the German Pig-Iron and Steel Syndicates in the days before the war. Certain fusions of interests and the purchase by Franco-Belgian groups of steel works in the Saar, and Luxemburg and Lorraine, point to the fact that those interests are fully alive to the possibilities that now lie before them, and although complete particulars of these are lacking, an attempt is made below to set down what has already been reported to have transpired in this direction.

SMELTING.

To Germany remains something over a half of her smelting industry, and the greater part of her refining and metal consuming works, but without the facilities she formerly possessed of feeding them with raw materials won largely within her own frontiers—a factor of prime importance in the history of her development as an industrial nation. Further, the favourable freight rates which German industry enjoyed through Lorraine, Luxemburg and the Saar now fall away, and the increased costs of transport within her own frontiers will have an appreciable effect on her cost of production.

Rhineland-Westphalian imports of foreign ores in 1913 amounted to 50 per cent of her consumption, and with the loss of Lorraine supplying 15 per cent, this district alone has to face imports to the extent of 65 per cent

of her requirements from foreign sources, which, with her depreciated currency and ore debts multiplied in ratio to the fall in exchange renders her economic situation very acute, and her industry less formidable as a competitor in view of the diminution of output and increased costs of production.

A correct appreciation of the economic changes, either in their scope or final result, is difficult, but if beyond the positive loss sustained by Germany, the severance of her arteries of supply, and the dislocation of the financial and commercial means of working with districts with which she had the closest co-operation are taken into consideration, it will be seen that Germany's future importance as a steel and iron producer is dependent upon her financial rehabilitation as well as upon the course of economic agreement with France.

In her production of coal, or rather coke, she has one factor with which to bargain, but which for the time is withheld by the clauses of the Treaty of Peace, requiring delivery of certain amounts of her output to Allied countries.

FRANCE'S POSITION.

France, by the acquisition of Lorraine, and co-operation with Luxemburg and Belgium, is on the other hand afforded the possibility of rounding off her industry in a very convenient fashion, as the following figures will show.

ORE PRODUCTION.				Tons.
Nancy-Longwy-Briey Basin	..			19,499,000
Other French sources, Normandy	...			2,215,000
Lorraine	...	...		21,133,000
Luxemburg	...	...		7,331,000
Belgium	...	...		200,000
Total				50,378,008
PIG IRON.				Tons.
France	...	...	...	5,310,000
Lorraine	...	...	...	3,870,000
Luxemburg	...	...	...	2,548,000
Belgium	...	...	...	2,476,000
Total				14,204,000

This requires about 45 million tons of ore of an average iron content of 30 per cent, thus leaving a surplus of about 5 million tons, of which the Saar district, now under the French sphere of influence, and producing a further 1,374,000 tons of pig-iron, will consume some 4 million tons.

These figures, accounting for nearly the total of French production, are not strictly accurate, as no consideration has been taken of Germany's previous imports of Swedish and Spanish ores which found part distribution to Saar and Luxemburg works, and they are further based on the assumption that the blast furnace capacity is working continuously on full output. Nevertheless, the figures given go to show approximately the change of position and its potentialities.

The production of France, neglecting Luxemburg and Belgium, under normal conditions, will double itself, as the following table shows, but due regard must be taken of the damage inflicted upon her works by the war, which will require some time to repair, and the acute shortage of coal and coke.

	Pig iron.	Steel.
	Million Tons.	Million Tons.
France	... 5'31	4'63
Alsace-Lorraine	... 3'87	2'28
Saar Basin	... 1'37	2'08
Total	... 10'55	9'99

It is difficult to ascertain in what measure the control by the French of basic raw materials will react upon German engineering industries, but the present French activities foreshadow that such of those works as lie in Luxemburg and the Saar will become assimilated, whereas the works within the present German boundaries will be to a great extent dependent upon France, and will not enjoy the advantages of cheap raw material to any extent approaching those afforded them by pre-war relationships.

GERMANY'S PRE-WAR OUTPUT.

In order to present a more complete picture of the change in Germany's position it

is thought that the following additional particulars of pre-war output should be added.

The 1913 ore production, according to grades, amounted to the undermentioned quantities :—

	Tons
German minette	... 21,136,265
Luxemburg ..	... 7,333,382
Brown iron stone :—	
12 per cent manganese	... 3,005,970
12 to 30 per cent manganese	... 330,037
Manganese ore, over 30 per cent	... 760
Hematite	... 1,102,067
Siderite	... 2,860,811
Magnetite	... 31,587
Blackband	... 57,827
Flusseisen stone	... 42,167
"Rasen" iron stone	... 36,346
Coloured ore...	... 4,066
Total	... 35,941,285

Exclusive of Luxemburg the 1913 production was therefore 28,607,903 tons, of which Lorraine delivered 74 per cent, and Lorraine and Luxemburg together 79 per cent, leaving now under the German sphere of control, without taking into consideration any new developments in other German deposits, 21 per cent.

PRE-WAR ORE IMPORTS.

The German production in 1913, however, did not in itself suffice for her own requirements, and she imported in that year a total of 14,019,045 tons from the following sources :—

	Tons.
Sweden ....	... 4,558,362
Spain	... 3,632,058
France (and Belgium)	... 3,938,017
Russia	... 489,381
Algiers and Tunis	... 617,567
Austria-Hungary	... 105,982
Newfoundland	... 121,175

Of this total, 2.6 million tons, consisting of two-thirds of Luxemburg ores, was re-exported to France and Belgium, leaving a net import of 11,406,000 tons.

The present position is, therefore, that Germany's remaining ore deposits at their

present rate of production cannot nearly supply her requirements, and she will be obliged in future to make up by import of foreign ores, chiefly of Lorraine, Swedish and Spanish origin. Nova Scotian output would possibly find a market were freight available and prices competitive.

GERMAN PIG-IRON PRODUCTION IN 1913

Dealing now with the pig-iron production of Germany, this in 1913 amounted to 19,291,920 tons, made up in qualities as follows :—

	Tons.
Foundry (0·4—0·8 per cent P.) ...	3,640,074
Bessemer (0·07—0·08 per cent P.)..	368,840
Thomas	12,193,336
Spiegeleisen	2,599,887
Puddle iron	489,783

The distribution of output was :—

	Per cent.
Rhineland-Westphalia	42·5
Siegarland, Lahn and Hassen-Nassau ...	5·1
Silesia	5·2
Middle and East Germany	5·2
Bavaria	1·6
Saar Valley	7·1
Lorraine and Luxemburg	33·3

From this it will be seen that the separation of Lorraine, Luxemburg, and the Saar deprives Germany of about 40 per cent of her pig-iron production, and that Rhineland-Westphalia and the rest of Germany is brought under the present conditions in a large measure under economic dependence of the French supplies, more so as with shortage of sea freight and inland transport, import of Swedish and Spanish ores is difficult. Rate of exchange with these sources operates adversely to purchase in varying degrees, and prices are more largely affected by this factor at the present time than by costs of production in the separate countries.

MILD-STEEL IN 1913.

Turning now to the production of mild-steel the distribution was as follows for 1913 :—

	Tons.
Rhineland-Westphalia	10,112,042
Silesia	1,422,144
Siegerland, Hassen-Nassau	388,297
North-East and Middle Germany.	740,859
Saxony	331,125
South Germany	253,020
Saar Valley	2,079,825
Alsace-Lorraine	2,286,354
Luxemburg	1,336,263

This makes a total of 18,949,929 tons, of which Rhineland-Westphalia and the remainder of Germany was responsible for about 70 per cent.

The distribution of Bessemer converter and Siemens-Martin furnace capacity of the various districts will be of interest, and is as given below, from which it will be seen that Lorraine, Luxemburg, and the Saar represent about 20 per cent, and the remainder of Germany 80 per cent.

	Tons.
Rhineland-Westphalia, Lahn, Dill, North and Central Germany, and Saxony	13,640
Upper Silesia	2,310
Saar Basin	1,300
Alsace-Lorraine	1,450
Luxemburg	560

Germany's pig-iron production will prove just sufficient for the needs of her steel works, and as her shortage for foundries and other purposes will require to be made up by imports, a market might exist for British over-production.

SUMMARY OF GERMANY'S LOSSES AND PRESENT CAPACITY.

The capacities remaining to Germany in her present frontiers in the production of steel castings, and electro-steel, in girder, rail, section, hoop-iron, boiler plate, sheet iron, tin-plate, rolled wire and tube rolling mills, are greatly in excess of the output of the district over which she has lost control, but her dependency upon them for raw materials is very appreciable.

In Germany, as made up of Rhineland-Westphalia, Lahn and Dill districts, South Germany, including the Palatinate, North

and Central Germany, Saxony and Silesia, the number of companies engaged in the production of various steel products as compared with the Saar, Lorraine and Luxemburg is set out as follows:—

		Steel castings.	Electro- steel.	Puddle furnaces.		
Germany	...	136	33	22		
Saar	...	5	4	...		
Alsace-Lorraine	...	3	2	1		
Luxemburg	...	4	2	...		
		Girder Mills.	Rail Mills.	Sec- tions.	Hoop Iron.	
Germany	...	26	26	64	31	
Saar	...	4	5	5	3	
Alsace-Lorraine	...	4	4	6	2	
Luxemburg	...	4	3	4	2	
		Boiler Plates.	Sheet Iron.	Tin Plate.	Wire Mills.	Steel Pipe.
Germany	...	40	67	5	33	27
Saar	...	2	5	1	4	3
Alsace-Lorraine	2	2	2	1	2	...
Luxemburg	...	1	2	...	2	...

PRE-WAR EXPORTS.

Germany's exports of iron in 1913 found distribution as follows:—

	Tons.
Pig-iron ...	... 856,431
Scrap ...	... 196,401
Semi-products	... 700,779
Rolling-mill products	... 3,801,031
Other iron products	... 942,613
Total	... 6,497,262
Machines	... 594,317
Totalling	... 7,091,579

The total value of exported commodities was in the same year over 2 milliard marks, iron and steel goods accounting for 1·3 milliards, and machines about $\frac{3}{4}$ milliard marks.

Germany's exports of iron in 1913 found distribution as follows:—

	Tons.
Great Britain ...	... 1,208,000
Belgium ...	... 648,000
Holland ...	... 595,000
Brazil and Argentine	... 471,000
Switzerland ...	... 333,000
Austria-Hungary ...	... 331,000
China and Japan ...	... 304,000
Italy ...	... 290,000
France ...	... 216,000
British India ...	... 213,000
Denmark ...	... 171,000
Russia ...	... 160,000
Spain ...	... 61,000
United States ...	... 54,000

CONCLUSIONS.

With the loss of over 40 per cent of pig-iron, and 40 per cent of her mild-steel production, German industry is faced with a position, the results of which are difficult to estimate. As stated before, her impoverishment is nearly equal to the total amount of her previous exports, and it is well known that these were fostered in every way, and even to the disadvantage of the home market.

With a mercantile marine to be rebuilt, and reconstruction to be carried out within her own boundaries, it would appear that little surplus for export would exist, and such quantities as Germany is now throwing on the market are largely the result of the present boom and the huge prices obtainable by the local manufacturers when converted into mark currency at the ruling rates of exchange.

Little attempt, if any, has as yet been made to put her own works in order, and such of them as were subject to the severe stresses of war production continue to run in a state the efficiency of which would bear little comparison to pre-war standards.

POSSIBLE DEVELOPMENTS.

A very pertinent question which British interests should ask themselves is to whom will Germany's previous markets in rolling mill and other products fall?

Germany can at best only hope to keep them in part, and her power to do so is dependent upon the degree of co-operation she established with Sweden or France.

Should a Franco-Belgian-Luxemburg combination enter the field British interests will find the competition very keen, and though it is realised that any fear of competition from this source is precluded at present by the huge demand and shortage of supplies, it will behove British interests to look ahead. The race for export as a means of rectifying collapsed exchanges will be a serious one, and one more in the minds of our competitors than in our own whose economic position is less serious.

It would appear that some form of partnership or co-operation either with the French groups or with the German refining industry would be of mutual advantage. A way to the former lies in the supply of coal, and to the latter in the supply of pig-iron or semi-products, and coal.

As a result of the economic consequences of the war, the whole industry has become chaotic, and this is exemplified in the market fluctuations which take place from month to month, and the feverish but feeble attempts at price regulation. There is in practice no such thing as a fixed market quotation, and deliveries are uncertain to the most marked extent.

The pig-iron producing industry, previously supplied with Swedish ores at 11 to 13 marks per ton f.o.b. Swedish ports, now has to pay 38 to 40 kronen, and is thus called upon to deal with an exchange situation with which any serious manufacturer is powerless to compete. With freight standing at 450 marks from Swedish ports, the price of ore delivered at works runs out at 900-1,000 marks per ton, or sixty times that of pre-war prices. Foreign bills to meet these demands have up to the present had to be supplied by the producers, and have not tended to any stabilisation of the industry. Germany's

debts to Sweden for previous imports have also had to contend with the difficult exchange situation, and the payment of interest alone on these have burdened producers with overhead charges, which as far as they are concerned, are without parallel.

Minette ores are to be had at present in very limited quantities, and chiefly in exchange for coal and coke.

The price fluctuations since the lifting of war control, and as compared with pre-war prices, have been abnormal, and have been due to the varied influences of exchange, shortage of coal and coke, shortage of ore, and critical transport situation.

There has been an insufficiency of semi-products to feed furnaces, and the demand for scrap has led to increases in prices in that commodity, from about 120 marks per ton in early 1919 to over 3,000 marks per ton in 1920.

An article which recently appeared in the *Taisho Nichi Nichi* shows some remarkable increases in the costs of Japanese cotton spinning companies. Comparing the two half-years of 1919, the rise shown during the second half-year for all companies is from 50 to 60 per cent. Investigations made by the Dai Nippon Boseki Company reveal that the company's expenses amounted to a monthly average of 1,650,000 yen from January to June, and of 2,500,000 yen from July to December, while the manufacturing costs of yarn of twenty counts rose from between 70 yen and 85 yen to 120 yen per bale of 400 lbs. For the first half of 1920 this figure is estimated at 160 yen. This increase in costs is due mainly to advances in wages.

THE MEANING AND VALUE OF NATURE STUDY.

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BEFORE we can go into the educational value of Nature Study let us see what we mean by the term.

It could almost be summed up in the few words "Man's interest in the world about him," but, though it is this yet it is a great deal more than this.

Primitive man took an interest in the world about him but it was purely an interest to satisfy his material needs. With the advent of books that interest gradually died out because it could be dispensed with. But though the interest whereby man could further his own material needs was no longer in the real thing because books were available man's interest from an aesthetic point of view was still centred in the natural world around him, and he must be a very materialistic person indeed who takes no interest in nature.

We can trace the development of this interest in nature from primitive times. Man's first relationships were to animal and plant life and nature has played its part in the work of civilization. Man has had to work with nature—he has had to overcome nature. A time followed barbarism when man began to understand nature better and a new relationship sprung up. He found in animals his friends and companions—he began to tame and care for animals and it is to this no doubt that the instinctive love for animals which we see in the child, is due. We see this instinct in the passion for pets and this should give much scope for animal study.

As far as plant life is concerned man saw in it his means of subsistence but gradually

his aesthetic sense developed and he could enjoy the beauty of the flower and as man developed he cultivated plants both because of their material value and their beauty. Through a study of plant life man has been able to differentiate between plants which are useful to him for his material wants and those which are welcome for their beauty and those which are poisonous and harmful—so man has learnt or should learn, to have in his home plants that are useful and beautiful.

Thus very briefly we have traced the gradual development of interest in nature. But when man takes a more than passing interest in the world around him—when he looks deep down into nature—when he begins to seek the reason why—when he notes the changes taking place around him then he has begun to *study nature*. So that Nature Study is something more than "Man's interest in the world about him"—it is deeper, wider, more awe-inspiring. Nature Study is by no means a new study if we go back to the time of Rousseau and Pestalozzi we can trace the development of the idea that man's education should be through things, not words, through interest in the world about him. Froebel very often gets the credit of being the originator or founder of Nature Study but the honour is rightly due to Pestalozzi. He lacked the learning and the initiative and the power of organization by which he might have made the study more organized and systematic—but the idea of it as an educational factor is undoubtedly due to him. Misunderstood and misapplied the study deteriorated into uneducational, uninteresting, isolated "object-lessons."

Long before Pestalozzi's time however there began a struggle between the upholders of the classics and the upholders of the sciences—a struggle which is still going on—on the one hand we see those who advocate a study of man and his work, his language, his literature, his history, while the upholders of the Science School would have

education limited to a study of man and the world in which he is placed. We have only to look at the curricula of modern schools to-day, to see, as the school-boy would say "which side is winning." Perhaps while we seek the meaning of Nature Study we shall see why this is.

Nature Study may exist in many schools under different names—Object Lessons, Observation Lessons, Elementary Science, Nature Study—but provided the spirit in which it is done and the underlying principles are right the name does not much matter.

Nature Study expresses best what is meant as we shall see presently. Whereas the other terms may imply knowledge gained from books or facts expounded to a class Nature Study implies a direct *study of nature*. I referred a short while ago to the isolated object or nature lesson—this is often associated with Nature Study but if there is no sequence—no order—it may interest the class for a time but it is not a study of nature.

Let us analyse the term nature-study and deal with the first half—*nature*—obviously then it is not a book study. I do not say "no books"—the teacher may use her books to guide her and give her suggestions or to explain facts and a wise use of books may be very helpful but she must go to nature in the first instance—nature must be her chief guide and counsellor. Pupils in whom, through the work of a keen teacher, an enthusiasm has been stirred will want books in order to know more and if, by actual contact with nature we have awakened in our class that desire to know more, we have done a very great deal.

But, as I said before Nature Study must primarily be a study of Nature—nature under natural conditions where possible. We have sometimes to bring nature into the class room and in a large city like this this plan has to be resorted to often, but undoubtedly the ideal thing is to take the class to nature, let the

children study plants and animals under their natural conditions—this can be continued in the school—we want the child to *see* things, to see them as they are. Nature is living, moving, developing—the old fashioned object lesson was as a rule artificial—dead—any model or picture accurate or otherwise served for a lesson. We want our class to feel that there are continual changes taking place in nature, that there is a history attached to the plant and animal life around us—that each has its own part to play in making that history—that there is an ordered and wonderful development taking place—what is more wonderful than the work of the ant—the development of the frog or butterfly—no isolated or occasional lesson can serve to bring out one iota of the wonder and mystery of it all—it is only by living continually with nature—by watching her ways can we feel the awe and wonder of it.

But Nature Study does not mean merely to enjoy nature—to see the beauty of it or feel the wonder of it—to read about it or talk about it. It is a definite ordered *study*.

We want to train our children to see the fundamental principles underlying nature and to understand these principles through the impressions they receive—the observations they make—they must find a reason for what they observe—they must *think*—they must endeavour to answer the questions "how" and "why."

Again nature must be studied in its relations so that the child will see the mutual dependence and interaction that exists in nature—we cannot take up a flower without realizing its relation to the weather and soil—to the insect that fertilizes it—to man and to other plants and flowers. It is for this reason, too, that we cannot expect to study nature by means of isolated lessons. We must endeavour to let the child see a connection between every piece of work in nature which he undertakes and *studies*. Let us take some examples—suppose we

study a particular flower—the sweet pea, for instance—to really study it we need to bring out its relation to its environment—the soil in which it grows, the need it has for air and water, and this will lead our class to see how the plant is adapted to receive such food and water—structure and function—the class will see that without food, water, light and air the plant could not live so that it is *dependent* upon these.

Again we cannot study the part of a plant, *i.e.*, its flower and leaf without studying the whole plant to which it belongs—thus the child sees how the part is dependent on the whole and *vice versa*—here again we see structure for function—the function of the leaf, the stem, the flower for the benefit of the whole plant and the structure of these in order to carry out the function.

Then again there is the relationship between the plant and the *animal*—it is, for example, essential to the sweet pea that the bee should visit it—it is likewise essential that the pea should have food.

Relationship to *man* is shown in the fact that plant life as well as animal life help to satisfy his material needs and contribute towards his aesthetic needs—inspiring the poet, the writer and the artist.

The relationship of Nature Study to *school work* is indeed close—only those who have carried it out in the proper spirit have realized what an incentive to other work the nature work is—it tends to stimulate interest—it gives the class an added pleasure in school life—it supplies material for many of the occupations and it is also a very valuable aid in other subjects.

Above all it brings the child closer than anything else can, to his *Creator*—he sees in the flower and in the wonder of animal life the power and goodness of the Creator; he sees, as Froebel says that “In all things there lives and reigns an eternal law.....All things have come from the Divine Unity from God, and have their origin in the Divine Unity—God alone.”

And now we come to the *value* of Nature Study.

The child's early life is lived with nature—he receives all his education from the impressions made upon his senses by the things around him—he learns through seeing and through doing. It is nature's way of educating the child, through a knowledge of his surroundings. If it is nature's way it surely is the right way, yet those who are responsible for the education of the child more often than not put an end to this method of education—no sooner the child enters the school instead of allowing him to gain further sense impressions and supplying material for this we begin to cram him with our ideas just as we endeavour to hinder his self-activity—the very means which nature has supplied whereby the child may grow and develop.

Nature study then helps the child to continue his education as it began—it gives material for the exercise and use of his senses, for his self-activity and love of doing. It supplies food for the natural instincts which are present in every normal child *viz.* imagination, love, reverence.

It is instinctive for the child to imagine—for him to wish to do things—but it is not instinctive for him to observe—that comes with training and nature study is valuable because it is a means of training the observation. It is a power that must be trained and developed—the eye of the botanist or zoologist is far keener than the eye of an ordinary individual. Nature students see far more in nature than those who take no interest in nature. But we want to develop the right kind of observation—the observation that sees beauty and wonder in everything, not the observation that seeks the mean sordid things of life.

We are continually brought face to face with the question “is it right to make all learning interesting?” Now is it right that there should be attention on the part of the pupils during every lesson? Undoubtedly

"yes" then you have interest for you cannot separate interest and attention; any one with an elementary knowledge of psychology knows how very closely these two factors are connected. Any attention that is not accompanied by interest is forced and besides being of little value cannot last. If you have interest you have the right kind of attention; therefore every teacher is keen on interesting her class. The knowledge the pupils gain will be in proportion to the interest we succeed in arousing the senses respond to interest—when we are interested we listen—we look—we touch. Have you ever watched the deeply interested child, if it is some story he is interested in it, his whole body takes up a listening attitude, his eyes are fixed on the story teller, the rest of the world a thing apart. If it is some object in which he is interested he turns it about, feels it, smells it, may be, tastes it. Every sense comes to the help of his interest. No nature study is worth undertaking in which the child is not interested.

To go back to the question of instinct, curiosity we know is an instinct present in a greater or less degree in every child. We all know the typical child who peeps into everything, who wants to know the 'why' and wherefore of all he sees. Untrained or wrongly trained this instinct may deteriorate into that disagreeable inquisitiveness so common in some children and so undesirable. Well trained it will develop into that desire to know more which will help him throughout his school life and after and will be a blessing to those who have the responsibility of his education. Nature Study gives us an excellent means of training this instinctive curiosity, the child will always make use of any material that supplies him with a means of satisfying his curiosity. Specimens, pictures, all help to awaken his curiosity, create interest, and arrest attention. By turning to good account the child's natural curiosity we will avoid boredom, laziness, and worse.

Having dealt thus briefly with the development and training of the earlier instincts of the child let us see if Nature Study assists us with older children though the values just mentioned will still be present and must not be overlooked.

Nature Study gives endless opportunity for aesthetic training. The School Nature Study Union in London has for its motto "To see and admire, not harm and destroy." One of the values of the story in the kindergarten and of literature in the school is in the joy it gives. To give joy should be the aim of most school work. It certainly should be of Nature Study. The joy it gives is one of the factors that makes it so valuable. The child gets untold joy in dealing with actual objects in seeing, feeling, etc. The child derives enjoyment in seeing living moving objects and in doing things for himself, in sowing seeds, tending his pets, making discoveries. But the real enjoyment is in the pleasure that the beauty and wonder and mystery of the object reveal, beauty in the ordinary commonplace things of life, this alone will create a love for and interest in Nature Study. There is joy in the contact with and observation of Nature. Let your pupil feel the wonder of the smallest thing; if we can do this we will not hear such remarks as "Oh, we have done trees" or "We know all about the snail." The attitude of the teacher should be the attitude expressed by Tennyson when he said:—

"Flower in the crannied wall,
I pluck you out of the crannies,
I hold you here, root and all, in my hand,
Little flower-but if I could understand
What you are, root and all, and all
in all,

I should know what God and man is."

We will get this attitude to a certain extent if we let the child see the relationship of parts to wholes, *e.g.*, the child will see the wonder of nature more clearly if he realizes the wonderful way in which the seed is fertilized, how insect and flower work together,

and then how nature provides for the dispersal of that same fertilized seed. Nature Study should be an incentive to us to make our homes and cities beautiful and arouse in the children a desire to preserve the beauties of nature by the cultivation of flowers, by gardens and by flower shows.

They should be able to appreciate the beauty of their environment or endeavour to make it beautiful. Aesthetic training does not only mean seeing beauty in form, in colour, in structure, in function, in adaptation, but a deeper beauty still—the beauty that the poet and artist see. The artist and the poet have been inspired by nature and it is our duty through nature to get the child to appreciate the productions of the artist and the poet.

Let the child enjoy the beautiful thoughts others have culled from nature. We may talk about clouds, their formation, their use, even their beauty of form and colouring, but how much more do we get out of.—*The Cloud*, by Shelley). I have touched on sense-training and aesthetic training but nature study also gives mental training, provided we attach the right meaning to mental training. Book study has occupied and still occupies far too much of our school time. One of Herbart's abiding principles is that all knowledge is assimilated according to the idea with which it is associated in the mind, now we are well aware that not only with children but with adults the strongest associations are those which have been gained through spontaneous self-activity; therefore we must select that which is closely related to the child's life and, as I have just pointed out, it is the living, moving developing world around him that is so near and dear to him. We want to form in the pupils minds an interest worth having—a deep abiding interest and we can do this by giving him opportunities of connecting all the new ideas we wish him to gain, with those in which he already has an interest so that all his school work can be closely connected with his nature work.

We do not want to cram him with facts but we want his mind to develop just as his body develops naturally. Nature Study is not "baby work" it is disciplinary; it requires just as much thought and judgment as mathematics. We cannot develop the intellect through supplying our pupils with a mere storehouse of facts, this may train the memory but we want to do something more than that; hence we want to keep books in the back-ground only by letting our pupils become little discoverers, finding out and reasoning out facts for themselves, and expressing them can we give valuable mental training. Thus we help to develop *Power*; power to think, power to judge, power to express. The school has always worked far too much apart from the Home. Home and School should be in closest unison; this is best done by Nature Study. Nature Study should not end with the days school work. It requires investigation and research and this will lead the child to continue his study in the home and in his walks with his parents he may interest them in the wonders of nature.

In these very practical days no doubt the question arises as to whether there is any practical value in nature study. We never mean that the school should be the training ground for a man's life work, though it might prepare him, nor does it aim at a technical education that is left to the technical school but nature study gives the pupils an insight into the ways by which man adapts himself to his surroundings and the means he uses to overcome his difficulties; it forms the bases, too, of much technical work, drawing, designing, gardening, etc.

But what we need most in our schools to-day is sympathy—perfect sympathy between teacher and children—all the nature study in the world is useless, worse than useless without this. Interest, observation, knowledge, power, love of the beautiful—all have their place in nature study, but above and beyond all this we must have sympathy,

love. We need to develop in our children a deep and abiding love for nature and we shall only do this in proportion as we are in love with nature. All the other values desirable as they are without love and sympathy will lead to wanton destruction—flowers pulled, birds' nests robbed in the desire to obtain material. Better leave Nature Study severely alone than to just start these desires in the child without accompanying it with the love that would not think of hurting a bird or deliberately breaking up a flower. By giving our children animals and plants to care for, we can engender a good deal of love and sympathy but we must be in sympathy with them and with our work. "We needs must love the highest when we see it" and surely we see the highest in nature. There we get the most valuable of all values—to get the child to see in nature an eternal law to see his Creator in nature—

"Each little flower that opens,
Each little bird that sings,
He made their glowing colours,
He made their tiny wings,"

The following circular has been received from the Consul—General for Norway at Calcutta :—An Industrial Fair will be held in Christiania, Norway, from 5th to 12th September next. It has a special interest to foreign buyers who may desire to take advantage of the present occasion as likely to facilitate the formation of connections between them and Norwegian producers and exporters. Such buyers are requested to apply in time to the Trade Intelligence Bureau of Norway, Christiania. The principal lines of Norwegian manufactures and articles of export may be ascertained on application to the Acting Consul General for Norway, 3 Chowringhee Mansions, Calcutta.

PLEA FOR PAPER MILLS IN MYSORE.

BY L. S. SUBRAHMANYA AIYAR, B.A.,
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IN his presidential address before the Economic Conference held recently, Sirdar M. Kantaraj Urs, made the following remarks with regard to large industries :—

"Though there is great scope for such large industries as cotton, silk, *paper*, woollen and oil mills, sugar factories, manufacture of leather, essential oils, medical preparations, etc., and the State has much mineral wealth, water and other sources of cheap power supply, it has failed to take the lead given to it by its abundant material resources."

"Owing to the construction of a large length of tramways in connection with the iron scheme, special facilities will be provided for cheapening the transport of materials required for the manufacture of paper-pulp. The exertions of Government officers will be in vain, unless private enterprise comes forward to take advantage of these opportunities, and start Joint-stock companies on a sufficiently large scale to deal with these industries."

These are words of advice, sympathy and encouragement, to capitalists and industrialists. The Mysore Government's solicitude for the welfare of the people and the advancement of the country has always been exemplary. The interests of the capitalists will also be guarded by them with sympathy.

In spite of the facilities thus afforded by the Government and the wealth of raw-material and fuel in our forests, cheap power and abundant natural resources, Mysore does not yet possess a paper mill. But with fewer facilities, a paper mill has been started in Madras with an authorized capital of

Rs. 10,00,000. The mill is proposed to be located at or near Madras, with subsidiary pulp mills at centres of raw-material. Though it is surprising to see that, in spite of the elaborate investigations conducted in Mysore regarding the establishment of Bamboo pulp mills, Madras has taken the lead over Mysore. So long as there is room and need for several more mills in India, it is hoped that Mysore will not lag behind. Even now it is not too late for local capitalists to think of floating a company for the purpose of exploiting the bamboo for paper-pulp.

It is my purpose in this article to discuss the questions of the site for a paper mill, the raw-materials available in the State for the manufacture of paper-pulp, and the chemicals, etc., needed and how to procure them, and finally to appeal to Mysoreans generally to take up the question of establishing a paper mill in Mysore in right earnest.

SITE FOR PAPER MILL.

The best plan to adopt in the matter of locating a paper mill is to have a Central Mill for the manufacture of paper at Mysore or Bangalore, with feeder pulp-mills distributed at four or five places near the source of raw material and fuel. Sound commercial keenness would recommend the same proposal as it is consistent with economy and efficiency.

The pulp mills can be started for example, at Benkipur, Nanjangud, Kankanhalli and such other places, having a suitable supply of raw-material, fuel and water. If Mysore or Bangalore cannot be accepted for the Central Mill on account of high cost of labour or want of good sites, any suitable place near to railway and electric power transmission lines may be chosen.

MILL MACHINERY AND PLANT.

The needs of pulp mills are a few machinery which can be made or procured within India. A crusher designed to crush bamboo, a straw chopper, a boiler to supply steam for power as well as digestions, two or three

digesters of large capacity to cook the raw-materials, a few beaters or edge-runner mills and a baling or hydraulic press. With these, the raw material may be digested, washed, ground, dried, packed and sent to the central mill. By adopting this method, the cost of freight is reduced to a minimum.

Intelligent mechanics should be able to run and manage such mills with the help and advice now and then, of an itinerant paper mill chemist, attached at other times to the central mill.

The central mill must possess all the machinery and plant required for an up-to-date paper mill, which must of necessity be imported. In addition to these there must be a complete set of experimental plant and a well equipped laboratory to conduct investigation on new raw materials and solving problems arising out of the routine work of the mill.

RAW MATERIALS.

Having fixed the site or sites for the mills the next step is the choice of raw materials and their supply. We have in our State a number of such materials suitable for paper. A classified list and description of those available is given below to facilitate choice:—

- (1) Rags and other textile wastes, and Waste paper.

These materials need no introduction, as they have been used from time immemorial, for the manufacture of paper, clean and better grades of rags find use in the manufacture of high class papers as bank notes, currency notes, etc. They always come in very handy to the papermaker, as they require no drastic preliminary treatment that bamboo, for example, should be subjected to.

- (2) Old ropes, gunnies and fibrous waste of fibre industries. In Mysore the quantity of these materials available may be small. But whatever quantities are available, may be collected and used with advantage.

- (3) *Bamboo*.—Bamboo belongs to the same botanical order as straws and bears a close relationship to the stems of the *gramineae*. The microscopical features of the bamboo are similar to those of straw, as also the chemical composition. Hence it is said that bamboo stem "may be broadly characterised as a gigantic straw."

Ever since Routledge set on the investigation of bamboo as a paper making material, bamboo has attracted the attention of the world. Subsequently the investigation of experts like Messrs. Sindall, Raitt and Pearson, have established beyond doubt, the suitability of bamboo for paper. My own humble experience in this line has shown, that even *hebbidaru*, a tough and thick-walled variety, can be worked up for pulp, especially when treated green. The chief difficulties at first encountered were the disposal of the nodes and the thick walls which resisted penetration of the caustic eye and difficult bleaching. But now the necessity to isolate the nodes is done with, and a system of fractional digestion is evolved which facilitates penetration of the eye and final bleaching.

Most of the varieties of bamboos available in the State are useful for paper. We have ourselves tested five varieties, of which *hebbidaru* and *kiribidaru* are available in very large quantities. The variety known as *Ochlandra travancorica* has struckers as the best suitable, if available in large quantities. It is more easily treated for pulp than *hebbidaru* (*Bambusa arundinacea*) and possesses fine silky fibres which produce good white paper. It seems, this variety being available in enough quantities, is used in the Punalur paper mills, in Travancore.

The bamboo in general yields strong and flexible fibres, possessing good felting properties.

- (4) *Straws and grasses*.—Of straws we have only paddy straw in our

State which is rather inferior to wheat, rye, barley and oat straws. But yet it is quite suitable for boards and paper, as our own experiments have proved. The evidence of greater authority is also in its favour. Samples of Egyptian rice straw were sent to the Imperial Institute, London, and their investigation showed that the straw when treated by the soda process yielded pulp of good quality suitable for the manufacture of white paper and that treated by soda or lime process, rice straw also serves for the production of straw-boards and brown paper. "The results obtained confirmed those already recorded in the United States."

As for grasses we have a number of varieties useful for paper making. In northern India the existing paper mills have been using grasses like ullagrass, munj, sabai grass, etc., for making paper. Some of the grasses of our forests, e.g. *Doddahanchihullu* (*Anthisteria imberbis*), *moodehullu* (*Anthisteria cymbarica*), *sole hullu*, etc., have been tested by us and found suitable. The same has been said by authorities on the subject, who conducted experiments on these, on behalf of the Government of Mysore.

In our forest grasses we have a plentiful supply of raw materials for making paper. They are at once easy to collect and treat, converted as they are to pulp more easily than bamboo, it will be advisable from the economical point of view to use them liberally.

- (5) *Sugar-cane megasse*.—Mysore State has not been till now an extensive grower of sugar-cane. But in view of the fact that vigorous steps are taken by the Government to encourage cane growing under the Marikanve and

Krishnarajasagara lakes, we may at some future date be faced with the problem of disposing of waste megasse.

Sugar-cane like bamboo belongs to the same order as straw, its microscopical features being similar to those of straws. The large percentage of pithy matter in it seems to disqualify it as a material for paper. But yet it is encouraging to see what is done in Hawaii. I quote from an expert's report:—

"It is a fibrous substance and lends itself to making paper-pulp. Admirable papers of many sorts have been made by its fibre by ourselves and others. These, however, tend to be hard and tinny; whereas our problem was to produce a pulp from megasse that would make a sheet which, under proper treatment, is strong enough to withstand the Hawaiian rainfall and yet give way under constant gentle pressure rather than by a punch."

This was to kill the unwelcome weeds and allow only the cane shoot to grow, piercing its way through the paper sheet. The experiments are reported to be successful and as reported in the *Paper Maker's Monthly Journal* of February, 1919, a project was launched to erect a megasse-paper-mill, at Olaa, Hawaii, capable of manufacturing 16½ tons of paper a day. "Its purpose primarily will be to produce the heavy mulching paper experimentally adopted in Olaa last year (1918) as a means of preventing the growth of weeds in the early stage of the Sugar-cane crop."

It is seen from this that megasse is quite suitable for making of paper, even of special qualities.

- (6) *Bast fibres*.—Under this class come flax, hemp, jute, sunnhemp, china-grass, etc. In Mysore we grow only hemp, which is neither extensive nor systematic, and as such the paper industry cannot expect any supply of raw material from this source.

- (7) *Fibres from leaf sheaths*.—Such as from aloe, agave or sisal hemp, and plantain stems, etc. These give fibres quite suitable for paper pulp. But as their fibres are valuable for textile purposes and the paper industry can expect to have only the waste fibres stuff, it is not worth while to consider the question of their collection. Further a good supply cannot be had, as these plants are not grown extensively in the State.

- (8) *Miscellaneous raw-materials*.—I had an opportunity to test such materials as lantana, cotton-stalks, *jambu grass* (a kind of reed), arecanut husks, etc., which were found to be suitable for at least brown paper and boards. The ultimate fibres of some of these, especially of lantana, are short and lack flexibility and strength and their pulps are difficult to bleach. These may be considered to be "desperate remedies" like saw dust, spent tan-barks, wastewood, dead leaves of deciduous trees, which sprung up to prominence in England and France, during the War. But amidst our plentiful supply of more suitable raw-materials, we need not now turn our attention to these. Yet in view of the fact that lantana has been a destructive pest, it is of interest to note that our results are confirmed by the results of experiments conducted in Australia. Of the various raw materials tried for paper in Queensland, it has been reported that lantana, gives a fairly strong brown paper "with a tearing strength of 20 to 25."

CHEMICALS.

The next step in the progress of the industry is the supply of the chemicals needed for the mill. The chemicals required are caustic soda, soda ash, lime, bleaching powder or electrolytic bleach liquor, rosin, alum, gelatin, starch, china clay (kaolin), talc, and ochres or coloured earths.

- (a) *Soda and Lime*.—The first process after reducing the raw-material into small chips or cuttings, is to digest them with chemicals in order to isolate the fibrous material termed cellulose, or eliminate the non-cellulose matter, which binds the fibres together. The non-cellulose matter, may consist of lignose, pectose, resinous or fatty matter, which are attacked and dissolved away by the chemicals, on boiling with them, under pressure.

For manufacturing wood pulp, sulphate and sulphate processes are employed. But for our purposes here, soda and lime processes will do.

Of the chemicals used for cooking, *viz.*, caustic soda, soda ash and lime, we have in our State only lime, and that too not of the best quality. The other two will have to be imported from outside. Sodium carbonate samples prepared by the Mysore Geological Department and private agencies from efflorescent earths, are quite good for the purposes of a paper mill. Caustic soda can easily be prepared from the crude carbonates, by causticising the latter with milk of lime. Only the mill will have to possess a causticisor. The supplies from the different earth soda producing centres, if efficiently worked, may be enough for a moderate mill.

- (b) *Bleach chemicals*.—After undergoing chemical boiling the material is called the "half stuff," which has to be washed, bleached and ground up for pulp. It is

customary to use for bleaching purposes either bleaching powder or electrolytic bleach liquor (sodium hypochlorite).

Bleaching powder is a substance which does not keep long in hot countries, and its manufacture requires cold temperatures. Hence for the manufacture of this chemical on a large scale, a cool climate is needed, which does not obtain in our country, except in places of high altitude during winter. A refrigerating room might be erected: but it will be expensive. Thus India has been a helpless importer of this material from foreign countries and she imports enormous quantities for her cotton and paper mills.

But we in Mysore are not justified in importing bleaching powder, when we can prepare our own electrolytic bleach liquor by electrolysing lime. We possess cheap electric power and common salt can be had cheap for industrial purposes. Further one of the ways of getting chlorine in manufacturing bleaching powder is by electrolysis of sodium chloride (salt).

Even in Europe for the last ten years, this electrolytic bleach has been preferred to bleaching powder in cotton and paper mills. Hence by erecting an electrolytic bleach plant at the central mill, dependence on outside supply is avoided and any amount of fresh bleach liquor can be made at the mill.

- (c) *Loading materials*.—Loading, sizing and colouring come next and are performed while the half stuff is undergoing disintegration to pulp in the beater. It is only when the paper is subjected to tub-sizing with gelatin that the operation is performed on the finished paper.

"The process of loading consists in adding a mineral clay to the pulp for the purpose of filling up the interstices or spaces between the fibres. Its functions comprise the compacting of the sheets, the production of a

pleasant mellow finish, smoothness and uniformity of surface, and the introduction of opacity and a degree of absorption requisite for the proper acceptance and drying of printing ink." Materials chiefly used are china clay, calcium sulphate, barytes (barium sulphate), talc, etc. Of these we get within the State kaolin and talc the suitability of which must be first tested before importing them. Most of the paper mills in India have been importing clays from abroad, under the impression that the local clays are not as good as the imported stuffs. But we get within our country soft, clean and lenacious clays which should be quite suitable for loading paper and should be given fair trial.

Calcium sulphate and barium sulphate are generally used for high class printings, chromo and art papers. They are either prepared by precipitating, or grinding pure mineral naturally occurring. These will have to be imported if high grade papers are contemplated to be manufactured.

Talc imparts a high finish to the paper and as such it is recommended as a loading material. This is also obtainable in our State.

(d) *Sizing materials*.—The materials generally used in sizing paper are rosin soap, gelatine size, starch and casein size. Of these rosin soap is the most common. Rosin was being imported to India from abroad; but in recent times a local source of supply has arisen from the Government Turpentine distilleries at Kumāun, and so India has not so much to depend upon imported rosin now. It is hoped that soon the whole of the country's demand will be met with by them.

We here in Mysore have any way to get our supplies from outside the State, unless vigorous steps are taken to investigate the local sources of rosin and their utility. Alum or Aluminium sulphate is also used in con-

junction with rosin soap to deposit on the fibres free rosin and aluminium resinate which act as cohesive and water proof materials. We have to import these also.

"Sizing treatment is mainly carried out with the object of imparting cohesion of the fibres, neutralising the tendency towards capillary attraction of the fibre tubes, and inducing ink resistance in requisite degree." Sizing gives strength and durability to the sheets of paper and render them proof against direct absorption of ink.

Gelatine size is generally used for high class printing paper. Gelatine and starch are substances which can be easily manufactured at the mill itself. Gelatine is prepared from hides, rejects and refuse from tanneries, and shoe-makers wastes. These materials we have enough in our country, if only efforts are made to collect them.

(e) *Dyes and Colours*.—Colours and dyes are used for what is called technically "rectifying whiteness" and for making coloured paper. Superior blues and pinks are used for the former purpose. Dyes and colours are classified under two heads, organic and inorganic, and these again classed into subjective and objective. Objective colours require the aid of a mordant to impart their colours to the fibres. Here in Mysore, we have to import all the colours and dyes from outside except perhaps a few ochres and red earth pigments, that may be used for cheap coloured papers, and hence we need not expatiate on the subject here.

I have thus briefly showed how most of the requirements of a paper mill can be met with from the resources of the State, which will go a great way to minimise the cost of production and thus leave a fair margin of profit for the capitalists. It is accepted on all hands that there is need for one or more

mills in the State and that the State can provide room and facilities for even half a dozen of them. While the industrial outlook outside the State is rapidly changing, and money is freely flowing into the channels of industrial activity, that capitalists in Mysore should feel diffident and shy is inexplicable.

That there is money in the paper industry, I am fully convinced. And I desire to press the point on our local capitalists. It is an industry which is bound to thrive with the spread of education and the advance of civilization.

The number of companies started in Mysore and the capital invested in them, is nothing when compared with the All India figures. In 1919-20, between April 1919 and March 1920, 906 companies were registered in British India with an authorised capital of Rs. 27,470 lakhs, with an average authorised capital of 30.3 lakhs per company; and since April 1920, a great many more have been started. By the side of these figures, what the figures are for Mysore is a matter for reflection and serious thought.

The Government of Mysore may be approached for necessary concessions, which it is needless to add they will view sympathetically. The State has the facilities of raw-material, cheap power, railway and forest tram communications, and above all industrialists have in the Mysore Government, genuine sympathisers with their aims and objects. May I appeal to our local industrialists and capitalists to come forward to float a company for starting a paper mill without further delay?

With reference to the Trade enquiries between the Bureau of Commercial Information, Bangalore and The Anglo-Egyptian Trading Company of Manchester and also the Batra's Agency of Lahore, such of the local dealers and merchants who are desirous of undertaking Agency business are requested to apply to this Bureau for the necessary particulars etc.

AID FOR RELEASED PRISONERS.*

I

BY THE INSPECTOR-GENERAL OF
PRISONS, MADRAS.

THE Calcutta Prisoners' Aid Society was founded in 1907; the Bombay Presidency Released Prisoners' Aid Society was started in 1914. Will it be in 1921—after another spell of seven years—that Madras follows example? It is a good example, so let us hope. Time is moving on, and it is highly probable that a public meeting to consider the matter will be held in Madras in the coming cold weather. A beginning has already been made. The press, ever ready to push a good cause, has been at work, and the idea is being spread by gentlemen who have the general welfare of society at heart. The Madras Social Service League has welcomed the idea and promised its assistance.

Probably the general mass of the population of the Presidency has never troubled itself to enquire into the position and prospects of a man who has been a prisoner. The Madras Government as a fact pays the man's way home and, if needed, grants a subsistence allowance to cover maintenance for one month to convicts released after 12 months' imprisonment. Obviously it cannot continue to support the man longer—without raising more taxation or without being cheated, as it cannot keep an eye on the men released to see if they honestly try to gain their own livelihood. The further help of a released prisoner is a proper object for that greatest of Divine inspirations, charity. Like mercy, it blesses him that gives and him that takes.

First we may analyse the word 'Prisoner.' We are all, more or less, offenders against the moral law—the law which all religious and social reformers have laid down for men

*Issued by the Madras Publicity Bureau.

to obey. The law has drawn a line through the list of moral offences and has ordered that persons who commit an offence which stands above that line shall go to prison, but it leaves those who do an offence which stands below the line to the punishment of their parents, priests, caste-fellows, or consciences.

If the law liked to put lying or back-biting, in the upper category, how few of us would avoid imprisonment? If the law forbade men to make profit out of speculation or to take any unearned increment, many a man of ease and repute would now be wearing His Majesty's Dungaree uniform.

Most of us are kept back from committing the more serious offences by our home or school training, our wealth or our religion. Most prisoners are men who have never been blessed with these amenities of life.

You may become a temporary guest of His Majesty either from a fault in your nature, or by a fault in your environment. The sinner-by-nature is a hard case which doctors and specialists will have to deal with. The sinner-by-environment is the gentleman that we are out to help. Only consider the environment of many of our fine cities. Probably only the padre or the district visitor can gauge its depths. If you lived in the poverty and squalor of the slums, with no healthy recreation to look forward to every evening and with despair as to how to find the morrow's food for your family and yourself—is it not probable that you would take to practices on which the law frowns? And the atmosphere in which you spent year after year of your miserable life would very soon permeate your mind and work in you a second nature which would deaden you to all the better influences of life.

Society in its growth has—unconsciously perhaps—created these slums and this nursery of crime. It is up to society to play the game and wash out its own sins.

Then there is 'Aid.' What is that? It is not just giving the released a rupee and

then a kick. It is the immediate provision of food and shelter to the man and more important still, the hand of friendship and sympathy. Then there is the effort to reclaim habituals and to fight hard against all the accumulated obstructions to healthy homes and surroundings, so that the seeds of evil may find it better to quit. There is the organization of methods of curing in time the casual or young offender. Schools of instruction to teach men trades—a work begun in the jails but often not completed by the time of discharge—would come within the programme. And there is the man's sustenance while he is starting new work, and perhaps the outlay of some capital for him, under supervision. In South Africa, the society keeps an eye on the prisoner's wife and children while he is locked up. This last charity needs no comment; it commends itself.

The man of Ease and Self will perhaps ask how he will himself benefit by supporting any such society. The answer may be found in the reports of those societies which have been long at work.

There are hundreds of released prisoners who do not need aid. They have their old jobs to return to or have relatives who can give them work or maintenance. On the other hand, there is a very considerable number who, if not assisted, will revert to questionable ways and remain a constant source of Government expenditure and of taxation. Mr. William Tallack writes in 'Penological and Preventive principles':—'The various efforts put forth of late years, in Great Britain, for the aid of discharged prisoners, have materially contributed to reduce the number of criminals. But like most other forms of beneficence, this good work is sometimes..... made a subject of censure by ignorant persons who raise the objection that when all the needs of honest poor men are provided for, then it will be the proper time to help the rogues, but not before. Now.....it may

be noticed that the people who raise these objections are generally such as never bestir themselves to help others.....and..... discharged prisoners are a class who absolutely require aid, on grounds both of mercy to themselves and of the self-interest of the community.' Criminals cost the community many hundreds of thousands of pounds. 'The reformation of a prisoner.....is one of the cheapest developments of social wisdom.'

Then there is the point of the society which will carry out the aid. Government cannot do it alone without raising fresh taxation, and Government work has to be run on the system of a machine rather than that of a man. It is the spirit of friendship that can do the work best. It is the man who will work for the love—not for the pay—of the thing that is needed. It is no good taking a plough to break a rock. You must use a crowbar. And there are hundreds of men of good intent who would rise to the occasion. When the war began, hundreds of old men rose to the call, and after a little training found themselves to be as fit for active service as the youngsters. Many a middle aged man or old fogey who is mouldering away and useless for want of a serious job in life might well take up an active part in the coming society and find his youth and vigour restored, and his soul becoming white by a new, though belated, interest in the more unfortunate members of the community. And the work will be wide and there will be plenty of scope for the activities of all who volunteer. All religions commend charity. It is a physical fact that charity develops a man's soul and makes him fitter for the hereafter. Not blind, indiscriminate, weak, simpering charity. But solid, thought-out, and reasonable charity. And the society that is to be, gives men of good intent a very good opportunity of rubbing the rust off that excellent ornament of their souls.

It is the non-official human being that can make the proposed society a success. It is the non-official being that has brought the co-

operative societies to so real and useful a state. The latter, however, has the impulse of self-interest to nerve his venture. The former will have as his inspiration a more altruistic motive which will make him the better man of the two.

The future must decide how far Government will contribute men, material and money. Our present object is to set the non-official thinking, talking, and preparing. His Excellency the Governor in Council desires to see the ground being thus prepared, and when the views of the Indian Jails Committee are known, the way will be open for the organization of the proposed society.

In a second paper, some details of the organization, aims and working of some of the existing societies will be laid before the public.

II

A few details from the report of the Commissioners of Prisons and the Directors of Convict Prisons (England and Wales) for 1913 may be of use, though the large number of charitable organizations and the number of clergy and visitors in England make relief more readily available than is yet the case in India.

In 1913, sixty D.P.A. societies sent in their reports to Government. Nearly £20,000 were subscribed locally, and Government added some £3,500 which would have been more, had more societies claimed what they had a right to claim. Money was spent on direct relief to prisoners, grants to homes, rent of premises, agents' salaries, etc., and these amounted to some £20,500.

There were 202,000 persons discharged, of whom the societies aided 42,000, and of this number no less than 7,500 are reported as doing well. Many More would be recorded if it had been possible to keep in touch with all the aided. And many released prisoners were taken charge of by the Church Army, the Salvation Army and other charitable societies.

The Calcutta Prisoners' Aid Society was founded in 1907 by Sir Harry Stephen. Its report for the year 1918-19 shows a list of 41 members. During the year, 151 persons were aided to the amount of Rs. 690. Shelter, food, clothing and work are provided for those who need them, the object kept in view being to dissuade them from reverting to crime. Not a few were aided to their homes in the mufassal. The society runs a workshop in which the ex-prisoners can earn wages, and the average wages received by them varied from Rs. 32 for a first-class workman down to Rs. 16 for a fourth-class one. The workshop machinery was in the first case old machinery given by Government.

In the Bombay Presidency Released Prisoners' Aid Society, members who pay Rs. 1,000 become patrons; those who pay Rs. 200 become life-members. Others pay Rs. 5 a year. The society is managed by a Central Committee of 12 to 24 members including the Inspector-General of Prisons, the Inspector-General of Police and the Commissioner of Police, Bombay. Government appoints one member and the rest are elected by the members. Ladies are eligible. There is an annual election.

The Central Committee can appoint district committees consisting of subscribers to carry on work in the districts. The Chief Revenue, Judicial and Police officers and the Superintendent of the District Prison are ex-officio members of these district committees.

The Central Committee can purchase, lease and hold lands, buildings and other property for the purposes of the society, and must make an annual report with statement of accounts.

The third annual report of this society—that for 1918—shows good and increasing work done. N. M. Wadia Charities contributed Rs. 1,500, the W. I. Turf Club, Rs. 1,000; donations for patronage and life membership came to Rs. 4,401, the Accountant-General gave Rs. 932. General contri-

butions came to Rs. 770. Payments include—Relief to prisoners released, Rs. 1,552. Agent and peons' salaries Rs. 776. Rent and petty expenses, Rs. 180.

The work done included jail visiting daily by the Agent Mr. M. R. Chitnis. Two other gentlemen gave weekly lectures in two jails. Five hundred and twenty-seven released prisoners received aid. This aid consisted of the finding of employment, temporary board and lodging, restarting the men in previous trades, assistance to get home, and in some cases clothing. Regular employment was secured for 85. Seventy-nine were helped with tools and materials to restart old work. Three hundred and fifty-one received food, and 50 received clothing, and 56 temporary lodging.

It is difficult to keep in touch with aided prisoners after their release, but Mr. Chitnis visited a large percentage of those who had found regular employment through the society.

Besides these two societies in Calcutta and Bombay a local society has been set on foot in Bellary, which has thus set a good example which the Presidency would do well to cogitate over and act upon. The society was organized in 1917 by Rao Bahadur C.S. Subramanyam, a non-official visitor of the local jail, and is supported entirely by local non-officials.

The scheme which is at present in mind is to establish first a large Central society in Madras itself, and then to get local branch societies going. The analogy of a hen and her chickens is not inapt, for the chickens might well hope to get a share of the food which the hen scratches up. And above all it is not desired to have parochial jealousies aroused. The societies are not to be started for the honour and glory of individual districts, but for the good of the humanity of the Madras Presidency. If they were to stand alone they might fail for want of sustenance or from a falling off in original vigour with

which they would be inaugurated. Local Co-operative Societies found that they were unsteady without a central organization which was ready to provide them with a solid backing.

Government will shortly give a lead. In the meantime, it is hoped that the facts that have been published may set men of goodwill and also men whose balance sheet errs on the side of credit, thinking if they will or will not 'fall in' as soon as the bugle goes. Even now they might in the various centres of jaildom begin to talk things over to one another and above all formulate suggestions for the care of, or the benefit of, prisoners whether still in jail or set free, and for the philanthropic care of the relatives who depend on these whose goings have led them to undesirable ways and their still more undesirable termination.

The Inspector-General of Prisons would welcome any such formulated schemes and would bring them to the notice of Government with the names of the gentlemen who are volunteering to lend their time and their money.

It must be understood that wherever the word 'men' has occurred in the above notes, it has been used in its widest sense and includes ladies. It is earnestly hoped that many ladies will co-operate. Their assistance is of course especially needed for discharged female prisoners, and if the idea of extending help to the prisoners' families also comes into the scope of the proposed work, their help will be quite indispensable.

EDUCATION THROUGH SETTLEMENTS.*

By C. R. NARAYANA RAO, M.A., L.T.

A settlement for the purpose of educating the adult is defined as an association of persons with different opinions and different tastes: its unity is that of variety; its methods are spiritual: it aims at premeditation rather than conversion and its trust is in friends linked to friends rather than in organization. It is in this latter regards that a settlement differs from institutions like the Y.M.C.A. which has a similar ideal and its practices are based on lines enunciated in the definition of a settlement. Even as an experiment in the field where there are so many agencies already operating for the diffusion of education among the working adults, the settlement institutions should have a fair trial. Settlements in the opinion of their organizers should appropriate to themselves by way of co-operation, part at least of the functions of the university, the church and the clubs. It requires all the fervour of a man who has seen visions of the "new world" to take charge of such a settlement which is to be filled with the spiritual and intellectual treasures of mankind before it enters on a practical stage of usefulness. No body will quarrel with the methods proposed to be adopted by the settlements to reach their ends, *viz.*, fellowship and service. The few institutions which have taken a very large part in public life and which we may call settlements are Mrs. Barnetts' "Toynbee Hall" and Miss Jane Adam's "Hull House." To some extent it is true that what a settlement requires is not finance or patronage,

* *Education Through Settlements* by Arnold Freeman, with a preface by A. S. Rowntree. George Allen & Unwin Ltd., London. Price 1s. 6d. net.

but a man of imagination and fervour who will co-ordinate his effort with other agencies along social, educational and spiritual lines.

The author writes from personal experience and the reader cannot escape from the belief in the immense potentialities of the method he describes. It is true that none can give an authoritative opinion on the settlement idea at this stage of its development, but as Mr. Rowntree says, "the virtue of this little book is that which informed from actual experience, it is all right with a healthy and refreshing imagination and is full of information and stimulating ideas for the guidance of those who may be thinking of establishing such institutions."

India is a long way behind the settlement idea. The university movement is slow, the country is split by creeds and dogmas: social life is practically unknown and women's education is just springing. But the reading of the book has a most stimulating effect on workers in the social and educational fields and if India should ever become a homogeneous country, the potentialities for the settlement movement are immense. We can only hope now for the speedy arrival of that day.

We take the following from the *Journal of the Society of Arts* for June:—At the request of the Mysore Durbar steps are being taken to construct a harbour at Bhatkal, to provide a sea outlet for the State of Mysore. According to the Department of Overseas Trade, the formation of this harbour has been suggested for some time, and is one result of the commercial expansion of Mysore, which has been increasing for some years past. Schemes for the construction of the harbour have been submitted, including the provision of breakwaters to provide a safe approach during the period of the South-west Monsoon. Accommodation will be furnished for very large vessels, both in the inner and outer harbours.

STATE-HELP TO INDUSTRIES.

[The following is a report of the proceedings of the Conference of Directors of Industries held at Simla on 12th, 13th and 14th April last under the presidency of Sir Thomas Holland, President of the Board of Industries and Munitions.—Ed., M. E. J.]

It states that Sir Thomas Holland in opening the proceedings mentioned that one of the functions of new department of industries should be a kind of clearing-house of information through which the experience of the province could be brought to the notice of directors. All were agreed as to the desirability of constituting an Imperial Industrial service on the lines suggested by the Industrial commission and accepted by the Secretary of State. It was generally accepted that the staffs of the provincial industrial departments were at present inadequate and early steps should be taken to begin recruitment as soon as the size and terms of the service could be settled.

NEW INDUSTRIAL SERVICE.

The following was also agreed to by the directors:—(a) for immediate requirements and before the industrial service has grown up special appointments of comparatively senior men would be necessary; (b) such men might be admitted to the service on the pay of a grade which corresponded to their age; (c) in addition to mechanical engineers men with some ten years business training might be admitted, a number could be probably found who would be inclined to sacrifice the uncertainties of a business career for the greater stability of Government service; (d) schemes for provincial industrial services should be worked out in the provinces; (e) the provincial service should in time form one of the main recruiting-grounds for the Imperial industrial service; (f) the Imperial service should so far as possible consist of Indians; the Conference

was generally of the opinion that it was desirable to have provincial boards of industries and such should be advisory rather than controlling in character.

TWO JOURNALS TO BE STARTED.

Regarding means of securing co-operation between provincial departments of industries both mutually and with the Imperial department, it was decided that two journals would be necessary, first in four parts annually which would be for general publication, and second a monthly report for private circulation among directors of industries both being prepared in the office of Imperial Department of Industries.

INDUSTRIAL EDUCATION UNDER NEW DEPARTMENT.

The conference unanimously agreed that it was desirable that the control of such education as pertained to the industrial department be transferred from the director of public instruction to the Industries Department, due attention being given to the necessity of consultation with the director of public instruction both as to method of teaching and consideration of courses. No decision was arrived at on the subject of commercial education, it being considered desirable to postpone action until the future of the imperial commerce department was settled.

INDIA'S PARTICIPATION IN THE BRITISH INSTITUTE OF ART EXHIBITION.

It was considered unwise to take part in the British Institute of Industrial Art without full information from the Indian Trade Commissioner. The conference were unanimously of opinion that India ought to participate; they agreed also to the necessity of appointing a commissioner who would get into touch with the organizer of the exhibition at "home," tour throughout India, make arrangements with local governments, the forest department, and firms for their exhibits and accompany the exhibits to England; the general opinion was expressed that the exhibit should be arranged

by provinces, as this method was likely to promote a spirit of rivalry and result in a better exhibition of Indian product. It was possible that Burma might have a separate building in order to show an example of Burmese architecture.

SETTLEMENT OF LABOUR DISPUTES.

As regards settlement of labour disputes the directors were informed that local Governments would shortly be addressed in a letter suggesting the consideration of the question of setting up some local machinery on the lines of the British Industrial Courts set in 1919.

IMPERIAL GOVERNMENT TO SUBSIDISE LOCAL INSTITUTIONS.

The conference was inclined to the view that it was generally better for the Imperial Government to subsidise local rather than build imperial institutions, and favoured the suggestion that the provinces should more or less specialise in different kinds of demonstrations, factories and such like, and reciprocate with each other in the matter of admitting pupils.

FINANCIAL HELP TO NEW INDUSTRIES.

Regarding financial and other forms of assistance for the new Industries conference, it was generally agreed that in cases which cannot be reached by banks but wherein the public interest, assistance is necessary, e.g., to test the possibility of successful manufacture to show the way to others or to produce an article required for national safety, direct financial assistance may be given by Government as (I) guarantee of dividends, e.g., in the case of large industries likely to pay dividends after a long period; (II) loans of money especially in the case of concerns with assets of a comparatively liquid nature; (III) agreements to purchase output, e.g., in the case of articles not previously made in the country but required by Government for its own purposes; (IV) contributions to share capital especially in the case of concerns which are important for

national safety but which the Government does not desire to undertake under its own agency. In all the above cases there should be Government supervision including audit and inspection, agreements to fulfil the original objects, but Government directors, if appointed, should not act so as to delay decisions. The capital of the concern should be raised in India under conditions which will give opportunities to small investors and encourage Indians to participate in industrial ventures. Loans to small or cottage industries and to co-operative societies or financial help in the purchase of plant on the hire-purchase system, as in Mysore and Madras; in this case special legislation is necessary to provide suitable means for the recovery of outstandings.

PIONEER AND DEMONSTRATION FACTORIES.

The conference also discussed other allied subjects, such as pioneer and demonstration factories, sugar school for India, organization of the office of director of industries, and relative spheres of imperial and provincial departments in the matter of research.

NEXT CONFERENCE AT CAWNPORE.

It was resolved to hold the next conference at Cawnpore, probably about the beginning of November.

The statistics of the shipping of different countries passing through the Suez Canal in 1919 make very interesting reading. The total net tonnage amounted to 16,013,000, of which the British total came to no less than 11,355,000 tons. Our nearest competitor was Japan with 1,449,000 tons, the next highest figure being 754,500 tons. In view of the fact that this was the first year after the war, the superiority of British shipping is extremely gratifying. But the fact must not be overlooked that there is still much ground to be covered before the pre-war position is regained, and that some competitors are now in a much stronger position than they were then.

ECONOMICS IN THE WEST.

The Paper Shortage.

London, 17th June, 1920.—No doubt you in India have not failed to take notice of the discussion that has been proceeding here in recent weeks in reference to the paper shortage and the means that are desirable to reinforce the sources of supply of paper making material. Hitherto paper manufacturers both here and in America have relied mainly for raw material upon supplies of wood pulp made from spruce which grows in Northern regions. Canada, Newfoundland, Scandinavia and Russia were the countries chiefly drawn upon before the War, but the falling off of the Russian supply and the immensely enhanced demand since hostilities ceased have tended to create a serious shortage the effect of which is world wide. In the emergency the paper makers are casting about for new sources from which they can obtain their raw material and all kinds of suggestions are being made as to the way in which the existing deficiency in pulp can be made good. One of the most promising of the proposals put forward is that bamboo should be utilized for the production of pulp. There are inexhaustible supplies of this wood in all the tropical regions of the Empire and if what tropical agriculturists and scientific experts state is to be relied upon there need be no difficulty whatever in the future about raw material for paper making provided there is a proper system of organization and pulp manufacture. On this subject Professor Carmody who was for a time Director of Agriculture at Trinidad makes some interesting statements in a letter to the *Times*. He alludes to an experimental factory which was recently established at Trinidad for making paper from bamboo. This venture unfortunately has not yet been carried very far owing to the fact that the leading member of the firm owning it was lulled in the

War. But Professor Carmody speaks with confidence of the practicability of manufacturing excellent paper from bamboo and mentions that he has in his possession a copy of the *Paper Makers' Monthly Journal* printed on bamboo paper made at the Ford Works Sunderland so far back as August 1879. In addition to bamboo the tropics, according to Professor Carmody, can supply large quantities of paper making material from "megass," the crushed and waste fibre of the sugar-cane. An actual experiment was made at Trinidad with this material in conjunction with para grass and the resulting paper found a ready sale locally for wrapping purposes. From all this it may be inferred that there is a vast field in every tropical country for the manufacture of paper pulp. The demand in the future for paper is bound to grow enormously with the spread of civilization and the possibility of a glutted market is very remote. The subject is one which should be taken up at once by the authorities in all British tropical dependencies and notabaly by the Government of India which has all the machinery at its disposal for the conduct of effective experimental manufacture.

FUTURE OF THE OIL SUPPLY.

Side by side with the discussion on paper shortage is proceeding a lively controversy in reference to the future of the oil supply. American sources of supply of this indispensable commodity are said to be giving out and alarming pictures are being drawn of a possible not distant failure of the export of oil from the United States. The position is probably not merely so desperate as some writers would have us believe as the States possess in the vast oil shale deposits of the Union a means of supplementing the supplies from wells which would yield if need be an almost inexhaustible alternative supply. But as far as Great Britain is concerned there is unquestionable cause for anxiety in the fact that so much of the country's supplies of oil have to be obtained from other than British

sources. The Government are now doing their best to remedy this deficiency and judging by the outcry which is being raised in interested American quarters not without a measure of success. They have several strings to their bow, but at the moment the most interesting and valuable one is the Mesopotamian oil field. The potentialities of this region are enormous. In the belief of some experts, indeed, it is destined to prove the most productive of all the world's oil fields when fully developed. However that may be the authorities are leaving no stone unturned to ensure that the mandatory territory may yield the fullest quota of oil at the earliest possible opportunity. At the time of writing the decision has not been announced in regard to the method of working the field, but it is highly probable that the arrangement with the Shell and the Royal Dutch Companies will go through in spite of the strong opposition which has been developed against it in the avowed interests of exclusively British Companies. So far as the public at large are concerned it probably matters little who is entrusted with the development so long as the capitalistic combination is equal to the very big task that lies before it, and that the Shell and Royal Dutch Companies have the necessary resources is beyond question. Mesopotamia, however, will by no means exhaust the energies of the Imperial Oil Department, which has been set up. The search for productive new fields is proceeding and almost any day we may hear that oil has been struck in some part of the Empire where its existence has hitherto only been suspected.

An admirable survey of the oil position as it exists to-day was made by Professor Sir John Cadman in a paper read before the Indian and Colonial sections of the Society of Arts recently. The statement contained some remarkable figures which are a wholesome corrective of the nonsense that is being written on the other side of the Atlantic about a forthcoming monopoly of the world's oil

supplies by Great Britain. At present, Sir John Cadman pointed out, the United States control at least 80 per cent of the entire production of oil in the world and Great Britain produces only about $2\frac{1}{2}$ per cent of the whole, or if Persia may be said to be under British influence, about $4\frac{1}{2}$ per cent. This tremendous disparity in favour of America is not likely to be altered materially to her disadvantage in the immediate future. The sources of supply that are being exploited are in the undeveloped stage and it must be a good many years before we are able to do without American oil. Sir John Cadman strongly defended the British Government from the accusation of selfishness in the prosecution of its oil policy in Imperial and mandatory territory. He asserted that the field for the most part was an open one and that the foreigner was permitted to compete on equal terms with British subjects save that in some parts of the Empire certain requirements as to British directorates and domicile are imposed on petroleum producing countries, while foreigners are excluded from India. As regards Persia, British enterprise was due to the individual initiative of Mr. W. K. D'Arcy who secured for his countrymen a concession which it was open to Americans or any other nationals to secure. An interesting series of tables embodied in the paper showed how the consumption and production of petroleum stand in the various parts of the Empire. India, it seems, consumes 1,146,000 tons and produces 1,292,000 tons,

THE TIN PLATE INDUSTRY.

India's entrance into the tin plate industry through the agency of the Tata Iron and Steel Company is considerably fluttering Welsh doves. Not long since Wales was supreme in the manufacture of tin plates; but of recent years America has made great strides in the manufacture of these products and is a formidable, and increasingly formidable, rival of the Principality in the world's markets. What makes

the Indian competition the more galling is the fact that the Tata undertaking had to obtain much of its machinery from the States instead of from Wales because of the excessive price charged for the Welsh equipment. It is felt that the day is past when the Welsh manufacturers could make their own terms in the market and that it will require all their energy and enterprise to maintain the industry in any thing like a flourishing condition. The trouble is the all prevailing one—the inordinate demands of Labour and the indisposition it manifests to give a fair day's work for a fair day's pay. Production in the States is on a far greater scale for unit than in Wales and manufacturers consequently are able to undersell the Welsh producers in most of the important markets. It is probable that the lesson of this Tata transaction will not be lost on the Welsh trade. The British working man is no fool and he is not likely to jeopardise his position by continuing tactics which manifestly are producing such disastrous results for the trade which gives him his livelihood. But as far as Indian competition is concerned, he is doubtless up against a proposition which will not be affected by any policy he may pursue. Tin plate manufacture in India is a natural and necessary development of the country's manufacturing industry and it must thrive if properly pursued as it doubtless will be.

SHEFFIELD INDUSTRY.

Sheffield industry is having the time of its life now that it has a free run for its manufactures. Before the War, Germany was a formidable competitor in all but the best lines of cutlery and the city's enterprise was in many departments in a languishing condition. Now all this has been changed by the elimination of Teutonic rivalry. Orders for Sheffield's characteristic productions have poured in from all parts of the world and the difficulty is to satisfy the extraordinary demand. Much is being done, as I have mentioned in previous communications, in

the way of amalgamation of business interests and mass production, and much more will be accomplished in the same direction in the near future. But the astute manufacturers of the Yorkshire city are not relying merely upon commercial arrangements to consolidate their position. They are giving serious attention to research work in order to develop the trade in new directions. Under the Government scheme there has recently been formed a British Cutlery Research Association to which most of the Great Captains of Industry in the city have given their adhesion. An income of £1,500 a year has already been assured for the organization and as the Government will contribute a like sum there will be no lack of funds for the initial operations. At a recent meeting of the Association a prominent citizen spoke of the great possibilities of improvement that were offered in every department of trade to a scientific system of study. Old as the Sheffield industry is it is still imperfect in many respects and it is only by a systematic application of modern principles to the processes of manufacture that it can hope to maintain the great position it occupies in the industrial world. Before the war Sheffield had to depend a good deal upon Germany for its material and much so-called Sheffield cutlery was really more German than British. This humiliating position is not likely to recur. Sheffield is now very wide awake and it will be difficult in future for any foreign rival to cross its path.

PRODUCTION OF SPELTER.

One of the outcomes of the war was an arrangement concluded between the home Government and the Government of Australia for the acquisition of a fixed proportion of the zinc concentrates of the Dominion with a view to their treatment in the United Kingdom. The transaction arose out of the desire to prevent any repetition of the events which led to the monopoly by Germany of this important material which is indispensable alike for the operations of commerce and the manufacture of the munitions of war. Although the arrangement has not been long in force a protest is already being raised against the system which it is intended to set up of manipulating the ore in this country. The question was raised in prominent fashion a few days since at the meeting of the Zinc Corporation, Ltd., by Mr. F. A. Govett, the Chairman of the Company. Mr.

Govett in the course of his remarks questioned the desirability of the Government subsidising the zinc smelting industry as had been proposed. "Spelter," he said, "can be produced far more cheaply in Belgium and elsewhere than we can produce in England, and cheap spelter is essential to the galvanizing trade. Therefore, so long as we are at peace, obviously the balance is in favour of importing the metal and not the material from which it is made. The same is true in war, for failing the retention of large permanent stocks in the country, either of spelter itself or of the ore or concentrates from which it is produced, we must then import at the risk of submarines. The risk in the same in either case, and the spelter naturally requires less ships than bulky concentrates and, therefore, the spelter is the lesser risk. There appears to be no reason at all why the nation should be taxed to support the industry on what to me appears an entirely illogical idea." In this argument Mr. Govett ignores the danger which the war showed to be a very real one, of the country, on the outbreak of war, finding itself entirely dependent on foreign sources for a material which was absolutely essential to the successful conduct of military operations. The economic argument, no doubt, is a strong one, but the question is whether this is not one of those cases in which economic considerations are over-ridden by the supreme need of ensuring the safety of the State. Certainly, there seems every reason why we should at least keep control of the industry, and that can hardly be done if we turn over to the Belgians or any other nation, the practical monopoly of the manufacture of the product. At the same time there is good deal to be said for the view that it would be unwise to minimise to attempt to restrict the manufacture of zinc to this country. A better system would be to distribute the work taking care to maintain a hold on a substantial part of the output so that it would be available in the event of war. For example, India might have her share and so provide material which she would need for the manufacture of munitions. The submarine argument would not apply in her case; and probably it would be found in practice that with her economical labour she could turn out spelter as cheaply as Belgium is able to do. The question is well worth attention both from the commercial and the military standpoints.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

Machine Weaves Wicker Furniture.

Washington, D.C., U.S.A., June 29, 1920.—

For some five thousand years man has been weaving wicker baskets and furniture by sticking upright stakes, or the weft, into a frame, then weaving the warp in and out. This process for ages past has always been a manual one. Until a few months ago, in fact, manufacturers of woven baskets, furniture and baby carriages actually asserted that it was an absolute impossibility to invent a machine to do this work. But, as has happened in many other instances, the machine has been built, patented, and is now in extensive use in the United States. The industrial importance of the invention will be realized when it is stated that a well known London firm has just paid to the American inventor \$1,500,000 for the British rights to manufacture the machine.

This interesting invention was made possible by a radical departure from the traditional manual method. Weaving, that is, is not done on the frame and in the final shape. Instead of this the frame is built in one part of the factory and the wicker fabric is woven in another. The last step is, of course, the application of the wicker fabric to the frame.

The loom is a revolving machine to which the stakes, or weft, are fixed over a pattern. The wicker, wrapped on two spools at the sides of the loom, is fed into it through an overhead tension pulley. As the loom revolves the wicker passes from the pulley to the shuttles, two of which are found on each machine. Emerging from the shuttles, the warp is met by star-shaped wheels which press alternate strands to either side. After the warp is woven thus a metal finger descends and presses it into place. So the weaving proceeds, at over thirty times the speed of the fastest and best hand weaving,

until the basket, chair or baby carriage fabric is finished. The loose ends of the weft are then bent over and firmly secured, finally, by hand, as in the old process.

FIGHTING FOR HEALTHY PLANTS.

The science of plant pathology, or the investigation and control of the diseases of plants, particularly those caused by fungi, has been pushed forward of late with the greatest rapidity in the United States.

During the period of the war, American experts in this field from the different states co-operated very closely to save as much as possible of every crop from the ravages of disease, and during the summer of 1919 this idea of co-operation was continued and extended with great success.

In the neighborhood of New York City two very important field meetings were held, one on Long Island (adjoining New York City) and one at New Haven, Connecticut, for the study of diseases common in those localities.

The first meeting (in June of last year) for the study of potato diseases in particular, was attended by about one hundred and fifty plant pathologists representing many parts of the United States, England, Holland and other countries. The farmers furnished motor cars and tours were arranged for the chief potato-growing sections of Long Island. In the evenings, mosaic, leaf-roll, wart disease, and other potato troubles which have been found difficult to combat were discussed at great length and from all viewpoints, with the best experts in the world on the spot to put their heads together and work out the best methods of control. This they did, and with great success.

The second meeting was held in August, 1919, and was attended chiefly by experts in plant pathology from the New England states and New York. Automobile tours covering a distance of 300 miles were made to plantations, gardens and nurseries between New Haven, Hartford and Storrs, Connecticut; while every evening of the week was

devoted to papers and discussions. The largest green houses in America were seen at Cromwell, where 22 acres are under glass in a single building, one house being 800 feet long and another 600 feet square, the latter being entirely filled with roses. The largest elm tree in the United States, if not in the world, is at Wethersfield, Conn., and is 30 feet in circumference, 97 feet high, and 300 years old.

A day was also spent in the tobacco growing regions of Connecticut, where broad-leaved tobacco is grown in the open, and the narrow-leaved varieties are cultivated under great tents. At one place were seen 290 acres under cloth.

NEW DAIRY PROCESS REDUCES MILK TO POWDER.

Although many bakers, confectioners and ice cream manufacturers have been using it for some time, only recently has the world learned the real value of powdered milk. The general public of nearly all countries still knows almost nothing, in fact, about this remarkable new commodity which can be stored almost indefinitely, then can be retransformed into fresh, sweet, nourishing milk by the addition of a proper volume of water.

Powdered milk is going to be very widely used throughout the world when it becomes generally known that the stuff will not freeze in winter nor deteriorate in summer, and that it can be shipped in quantity at a small fraction of the cost of transporting the liquid milk.

The milk is converted into the powder by an interesting patented process, which is, briefly stated, as follows:—After careful test the milk is poured into vacuum pans, where part of the water is extracted at a temperature which does not coagulate the albumen. The resulting liquid is then forced at high pressure through tiny holes in metal plates. It emerges as fine spray into a current of heated air. As the moisture is absorbed by the parched air the suspended solids fall, like

drifting snow, to the floor of the process chamber. This powder, resembling the finest white flour, contains less than two per cent of moisture, and on tests is found to harbor no bacteria, whatever. The warming and spraying produce absolutely no chemical effect or change.

It is said that the series of experiments which resulted in the perfecting of the powdered milk process covered over three years.

TRACKLESS LOCOMOTIVE RUNS OVER AMERICAN HIGHWAYS.

As I write, somewhere between the states of Indiana and California a locomotive on rubber tyres is tooting its whistle and ringing its bell for the right of way on the national highways—the first trackless railroad engine to make the long trip from the Atlantic to the Pacific coast.

The strange vehicle is really an automobile rather than a locomotive, of course, but it is far from being merely a car with a freak body. From the rivetted steel boiler with its smokestack exhaust to the cab, and back of that the short tender, the whole machine is built in exact replica of a modern railroad engine, and built to stand the roughest of treatment. It is mounted on a chassis of 145 inch wheel-base equipped with a six-cylinder, 90 horse-power motor, and is capable of speeds up to 50 miles an hour. The total length is 21 feet, the width 5 feet, 8½ inches, and the height 7½ feet, the weight being 5,000 pounds. All the controls and gauges are in the cab, located above the fire box, in regular locomotive style.

The curious machine represents the handiwork of a well known Indian automobile enthusiast, whose particular hobby is the construction of queer cars. They are now to be manufactured on a large scale by a leading middle west motor building company.

MACHINE DISINFECTS SMUT-THREATENED GRAIN.

Heretofore the progressive cereal farmer has tried to avoid loss by smutting of his

harvest by utilizing tubs, barrels and similar containers, in which he has mixed his formaldehyde solution, and soaked his sacks of grain. This process is necessarily slow and is often unsatisfactory. Now, however, the farmer most effectively can fight this parasitic fungus with the aid of a simple machine which quickly disinfects each grain without soaking it, or wasting a drop of the solution. The machine consists of a conical grain hopper and a solution reservoir. As the two outlet valves are turned, grain and solution are fed by gravity to the conical mixer, where they are rapidly mixed by a whirling cone. As this cone is revolved by the weight of the down-pouring grain the machine requires no attention other than the occasional filling of the hopper and reservoir. The disinfected grain pours out of the bottom of the mixer. Attended by two men, the machine has capacity of from 100 to 125 bushels an hour.

A NEW ELECTRIC WATER HEATER.

A nationally-known electrical authority makes the statement that his experience with ordinary electric water heaters of the resistance type has been unsatisfactory, as the wire burned out frequently and had to be replaced. This difficulty, he states, has now been satisfactorily solved by the use of a heater employing no high-resistance material and having practically nothing to burn out. In short, says he, it is built on the principle of a welding transformer: The coil of copper tubing through which the water circulates also carries the current which heats the tubing and the water inside. This current, flowing in a circuit of such low resistance, depends on the production of a low voltage by induction, as in any ordinary transformer.

The transformer core is of the shell type, having the windings about the central member. The instrument is mounted at the side of the water heater, and the water is piped from the bottom of the tank to the lower end of the coil of copper tubing. On emerging from the upper end of this coil it flows back

into the tank, entering at the top, so that whatever water is heated ready for use will remain for some time at the top of the tank, not mixing with the cold water below.

The coil of copper tubing, besides conducting the water, forms the secondary (or low voltage) coil of the step-down transformer, developing about two volts. This amount is sufficient to send only small current through the coil of tubing when the circuit includes the water tank and the iron piping to and from it. When, however, the two ends of the tubing coil are short-circuited by connecting across them a piece of heavy fuse wire the resistance of the secondary coil becomes very low, and a heavy current flows through it, heating the tubing, and hence the water flowing through it. The short-circuiting conductor should be made of such a size of fuse wire that, should the system go dry or overheat, the fuse will blow, thus leaving only the circuit of higher resistance through the iron piping and tank.

While a transformer of this type cannot be expected to attain a very high electrical efficiency, still the heat is transferred very directly from the tubing in which it is developed to the water flowing through it. Hence, the water wastes hardly more heat than one which is submerged in the water to be heated, and has the advantage of containing no resistance element which is likely to burn out. The heater described uses from 500 to 1,500-watts, depending chiefly upon the resistance of the short-circuiting fuse. The tank is heated to the boiling point in about fifteen minutes.

AUTOMOBILE CONTROLLED FROM AFAR BY WIRELESS.

Simple as its secret of operation may be to the wireless expert, the distant control of a motor-driven vehicle is always a strange and wonderful performance to the layman.

A small electric automobile weighing about 250 pounds, recently built by a New York state inventor, is mystifying large numbers of spectators by its antics under invisible,

but very effective, guidance. The operator sends out the actuating wireless waves from a signal-corps field set mounted on his auto, the antennae wire being stretched to the nearest tree or post. The first pressure of the key starts the little car off on a straight line, from which it is turned to the right by a second pressure. A third impulse straightens it out, a fourth turns it to the left, a fifth straightens it out again, and a sixth stops it.

All of these movements are accomplished by switch bars on a drum in the car, which connect local batteries to the proper starting, steering or stopping magnets. A ratchet arrangement rotates the drum one step at each wireless impulse.

When the operator wishes the car to skip some of the sequence of movements he sends out two or more impulses in quick succession, and the mechanism obeys only the last one. A tall mast on the car bears a green pilot light at its top, its flash telling that the circuits are in good working order. So promptly and accurately does the little vehicle respond to its distant control that its inventor has steered it successfully through a large throng of people.

HIGH-PRESSURE STEAM DRIVES SMALL TRACTOR.

Although steam was the original motive power used for tractors, certain advantages of the internal combustion engine have brought it to the front in recent development.

Now, however, a new steam-driven tractor has made its appearance, in which all the refinements of modern practice are incorporated. This new tractor is being widely adopted in many sections of the United States. It has a water-tube boiler with 34 half-inch tubes, 11 feet long, and delivers superheated steam at 550 pound pressure. No scale is formed in the tubes, which are removeable and may be adjusted to any desired power.

The two-cylinder engine runs at 20 to 800 revolutions per minute, delivering 26 to 70 horsepower to the 60 inch driving wheels. The whole machine, which is less than 12 feet long, 5½ feet wide, weighs but 3,500 pounds. It runs at any speed between ⅛ and 7½ miles per hour, and its burners are adapted to the use of either kerosene or distillate as fuel.

AUTOMATIC COUPLER CONVERTS WAGON INTO TRUCK TRAILER.

A coupling arrangement for the back of a motor truck that enables it to be backed under the front end of a wagon and automatically connected, making a semi-trailer, has just been placed on the market by a Massachusetts manufacturing firm. The coupler is similar in form to the "fifth wheel" of a wagon, but is pivotted transversely to give flexibility to the system, and provided with coil springs to take up shock. The bolster plate and upper circle of the attachment are fastened to the wagon bed in place of the regular fifth wheel, and slide into locked engagement with the truck portion when they are brought together. It is disconnected by pulling a lever from the driver's seat.

ALFRED T. MARKS.

The Madras Publicity Bureau says:—As soon as the Local Government (Borrowing) Rules are brought into force under the Reforms Scheme the Local Government may, with the previous sanction of the Government of India, raise loans to meet capital expenditure on the construction or acquisition of any work in connection with (1) the improvement of irrigation or communications, the supply of electric power for industrial purposes, (2) building or housing schemes, (3) schemes for the drainage or reclamation of land, for the development of forests and forest industries and for certain other purposes. The Madras Government have accordingly asked heads of departments to submit a list of development schemes already sanctioned or under consideration which might be financed from borrowings under these rules.

NOTES.

In regard to the impression which commonly obtains to the effect that aviation is still a more or less dangerous pastime it is interesting to note some facts obtainable from the latest returns. It appears that during 1919 there were established at least thirty air stations to which the public had access for flights. In the six months from May 1 to November 1 approximately 30,000 passengers were taken for joy and business rides, and during the whole of this time, and in connection with every one of these trips, not a single accident occurred. It must also be mentioned that the daily passenger-carrying service between this country and Paris has run now for over a year without the slightest hitch except such as have been due to extraordinary climatic conditions. In fact, it may be said without hesitation that so far as reliability and freedom from interruption are concerned, this service compares favourably with that of any coastal or ocean-going steamship service. During the recent Peace Conference the aerial transport service, which everyone knew was running, carried no less than 700 passengers altogether without delay. In fact, the record says: "With perfect security and regularity." When we consider that the aeroplane is capable of what can only be regarded as stupendous feats as regards output of power, reliability, and regularity of running, the prospects for civil aviation are really extraordinarily bright in spite of the clouding effect which official indifference has had. It is not in the nature of things that anything capable of carrying immense weights at immense heights at immense speeds should be relegated. Obviously a machine which can cross the Cordilleras at a height of over 20,000 ft. is rather more than a toy. Between Valparaiso and Santiago an aerial mail service has been in operation for some time, and we have yet to learn

that it has suffered any interruption. American air services in particular have been marked by their regularity and reliability, and it is to be hoped that civil aviation in Great Britain is now about to receive that recognition which is its undoubted right.

.. ..
An engineering correspondent writes to the *Near East*:—Some little time ago I had an opportunity of inspecting the "Glasgow" tractor and comparing it mentally with the dozens of different types of British, American, and Italian tractors it has been my fortune to inspect during the past three-years. I may say at once that I have formed a very high opinion of the "Glasgow," which, by the way, is one of the many products of the British Motor Trading Corporation, Limited. In design it is a three wheeled vehicle which is noticeable in that it has a drive to all three wheels. This not only leads to the perfect utilization of the power generated, but it ensures an adequate wheel-grip under all conditions. No matter whether the soil is sandy or clayey, wet or dry, the tractor may be relied upon to do its work in the best possible style. It has a four-cylinder engine of $4\frac{1}{8}$ by $5\frac{1}{4}$ inches bore and stroke, and is rated at 25 horse-power, but it is, of course, capable of giving out a larger amount of power should it be required. The engine is fitted with a Piercetype governor controlling the engine speed, and a combined system of forced feed and splash lubrication is adopted. The tank has a capacity of 14 gallons, and other features worthy of notice are the gilled tube radiator, the Halley carburettor, and the high-tension magneto. Two speeds and a reverse are provided, and on top gear a speed of five miles per hour is attainable. The tractor, I should judge, is particularly suited for work on bad ground and on steep hills.

.. ..
The British Consul-General at Osaka writes:—A new company, called the Naniwaya Company, Limited (Kabushiki Kaisha

Naniwaya), has been formed at Osaka, the object of which is to erect a building and use part of it as a department store, while the remainder will be let for office purposes. A site of 2,000 tsubo (8,000 square yards) has been secured at Nakanoshima, in the business section of Osaka, and it is planned to erect a building which can compete with the seven storey store of Mitsukoshi, the pioneer firm of foreign style enterprises of this nature in Japan. The nominal capital is to be Yen 30,000,000, divided into 600,000 shares of Yen 50, of which the promoters and the vendor of the land will take up 580,000, leaving only 20,000 for public subscription. The construction of the building will probably require two years. Doubtless the articles stocked by the various departments of the store when completed will be principally Japanese, but there will also be an opening for fair quantities of miscellaneous foreign goods, such as tinned goods, liquors, haberdashery, fancy goods, toys, and furniture. A taste for foreign goods already exists among the Japanese, especially those who have been to Europe or America, or whose business brings them in contact often with foreigners, and the recent increase in the numbers travelling should augment the demand.

The latest statistics regarding the development of the French Protectorate of Morocco illustrate very clearly the remarkable character of the work accomplished by our ally in that country in the space of a few years. Last year the area under cultivation was about 6,000,000 acres, as against 2,500,000 acres in 1912. The growth of communications is even more striking. There were six miles of roads in 1912, but by 1919 there were 1,500 miles. Progress in railway construction has also been considerable, though naturally not in anything like the same proportion, and developments in this direction have been to a great extent postponed on account of the war. When the programme of construction has been carried out, how-

ever, Morocco will be admirably situated as regards transport facilities. The development of agriculture and the extension of communications have naturally brought a great expansion of commerce, exports rising from £2,680,000 in 1912 to £8,280,000 in 1919.

It is not presumed that any Municipal Corporation in India will achieve success in establishing a Municipal Bank. But nevertheless it is of interest to note that a project is afoot to establish a municipal bank in London. It is proposed to model the scheme closely on the lines of the Municipal Bank already in successful operation in Birmingham, where the first institution of the kind was inaugurated in 1916 by Mr. Neville Chamberlain. The bank gives $3\frac{1}{2}$ per cent interest to depositors, and lends money to the Corporation at 4 or $4\frac{1}{2}$ per cent. The policy on which it is conducted, however, is not to make a profit by municipal banking, but to foster the savings habit among the wage-earning classes, to stimulate local patriotism, to invest in civic enterprises, and to augment the financial resources of the local authorities. All these objects seem to have been reasonably realised by Birmingham's Municipal Bank, which now records over £1,000,000 in receipts from some 50,000 depositors. An example worth pondering.

Speaking on the subject of "Rubber for Industrial Purposes" recently, Mr. C. E. Alsopp, at the Technical College, Bradford, enumerated the many uses to which rubber is put to-day in industry. From an engineering point of view rubber is one of the most useful products known, and it is certain that our automobile industry would not have developed so fast or so far had it not been for the suitability of rubber for tyres. Vulcanite is another form of rubber which is largely used by engineers. Mr. Alsopp dealt in detail with the early discovery and cultivation of the rubber plant, and said that whilst the production of wild rubber was stationary that of plantation rubber was steadily increasing. About 90 per cent of the world's total production of plantation rubber is handled by British companies, and about 83 per cent is obtained from British territories.

GLEANINGS.

The Cotton Research Association has issued its first report outlining an important programme of research work. The chief aim will be to arrive at the principles or theory underlying the practice of the cotton industry, leaving the application of the theory to those actively engaged in the industry, but it is fully recognized that applied research cannot be entirely omitted, especially in respect of such matters as may be considered beyond the resources of individual firms. The necessity for applied research was pointed out in our special Cotton Section, and we trust that in this matter a programme will be drawn up on thoroughly practical lines. The activities of the association, which after unavoidable delay is only now entering upon its natural work of research, will be watched with interest.

Japan has discovered a new fibre to mix with cotton, which promises to cause a revolution in cheap fabrics in the Far East, says the *Japan Magazine*. It is a kind of sea grass known as sugamo, which, when properly treated and mixed with raw cotton, makes a thread strong and useful for cheapening the material, which is now so high in price. The annual value of raw cotton imports to Japan is about 300,000,000 yen, with about 18,000,000 yen for ramie and 52,000,000 for wool, but if the mixing of raw cotton with sea grass proves a success, such large imports of raw cotton will not be necessary. This sea grass flourishes plentifully about the shores of Japan. The botanical name of this grass is *phyllospadix sconeitei*.

For the purpose of developing the beet-sugar industry Australia has inspected such factories in America, and intends incorporating the most up-to-date machinery for the

treating of sugar beet into an Australian plant. The University of California has been asked to select a quantity of the best beet seed for the production of this sugar beet. The Victorian Government has also purchased from America a fruit-drying plant, by the use of which all danger of the Australian fruits being spoiled by rain in the process of drying is to be obviated.

Consignments of German goods are beginning to arrive in Colombo. According to a Colombo message, the N. Y. K. steamer "Durban Maru" recently brought lace and other sundries for four well-known firms. The prices are said to be considerably higher than pre-war, but the quality is much superior to the cheap Japanese articles with which trade has been flooded since 1914.

A recent article in a Japanese paper points out that of the industrial products of Japan, which amount to \$ 1,850,000,000 per annum, 45 per cent consists of textiles, 32 per cent articles of food and drink and chemical goods, and only 14 per cent machinery. Machinery is hardly exported at all, but it is imported to the value of \$ 1,500,000,000 to \$ 200,000,000.

The total exportation of sugar from the Dutch East Indies in 1919 amounted to 1,819,475 tons, compared with 1,416,911 in 1918. The United Kingdom took 77,100 tons in 1918; 295,363 tons in 1919, compared with 271,922 tons in 1917.

A new coffee exchange has been established at Santos (Brazil). It will be 70 metres long and consist of 3 storeys. At the official exchange founded two years ago, over 60,000,000 bags of coffee have been sold.

Speaking recently at the Social and Political Education League, Law Auldane said that "the present education ladder is too narrow and too little used."

A correspondent writing to the *Times* (*Trade Supplement*) says, that "Japanese competition in the Indian market seems likely to prove more serious than is generally realized."

ECONOMIC NOTES.

FRUIT CULTURE.

To Prevent the Rapid Decay of
Ripe Fruit.

The *Farmers' Journal* says:—

Certain experiments have recently been conducted in the Jodrel Laboratory, Kew, with the object of ascertaining the relative value of various substances in preventing the rapid decay of ripe fruit. These experiments were based on the fact that the primary cause of decay and rotting of ripe fruit is in most cases due to the presence of the germs of fungi, yeasts, bacteria, etc., on the surface of the fruit and not—within a definite limitation of time—to any inherent tendency on the part of the fruit to decay. Among the various substances experimented with commercial formalin = (formaldehyde, 40 per cent) proved to be most suitable on account of its efficiency, cheapness and ease of application and because of the entire absence of danger in its use. The method of the treatment is here reproduced.

“In the case of fruits, where every part is eaten, as strawberries, etc., the fruit should be immersed for ten minutes in cold water containing 3 per cent of commercial formalin. On removal immerse the fruit for five minutes in cold water, and afterwards place it on wire netting or some similar open material to drain and dry. When the fruit has a rind or skin which is not eaten the immersion in water after the treatment in formalin can be omitted with advantage.”

During the season a good series of experiments have been conducted at Kew, for the purpose of checking the results previously obtained, and of experimenting with other kinds of fruit. No special selection was exercised in procuring the fruit for experiments. The plums, cherries, grapes and pears, were purchased at a local fruit shop, and the gooseberries and bananas were obtained from a street vendor. In each case a certain portion of the fruit was treated with formalin; this was placed alongside an untreated portion on a plate of glass, the two were covered with a bell-jar, and exposed to the ordinary temperature of the laboratory. The following table shows the number of days that treated fruits remained perfectly sound, free from mildew, after the untreated check fruit had become covered with mould and quite unfit for use:—

Plums	{ Damson	...	9 days
	{ Victoria	...	6 "
Bananas	...	...	10 "
Currants	{ Black	...	5 "
	{ Red	...	4 "

The following table shows the kind of fruit used last year for testing the preservative properties of formalin, and indicates the number of days during which treated fruit remained perfectly sound, after the check or untreated fruit had become unfit for use. The first column of figures indicates last year's experiment, the second column to this year's corroborative experiments.

Cherries	...	...	7 days	8 days
Gooseberries	...	...	7 "	6 "
Grapes	...	...	4 "	6 "
Pears	...	...	10 "	9 "
Strawberries	...	...	4 "	5 "

It is important to remember that all kinds of fruit experimented upon were ripe and been exposed for sale, and were consequently exposed to infection, and that in some instances they were more or less bruised. With fruit carefully gathered and treated at once, the duration in a salable condition might be anticipated to extend over a long period of days than is indicated by these tables. In the case of apples that are just pitted with disease, treatment with formalin proves of service. Apple rot caused by fungus called *Gloccosporium fructigenum*, Berk, is very destructive to ripe fruit, on which it first appears as minute scattered spots on the skin; these spots rapidly extend and form large, brown sunken patches; within a short time this fungus reduces the fruit to a brown rotten mass. A dozen apples showing the first stage of this disease were immersed for a quarter of an hour in a solution of formalin of the strength given above, and afterwards dried. This was done during the last week in August, the spread of the diseased parts was completely arrested, and the apples were at the end of November in good condition. A dozen similarly affected apples collected at the same time but not treated with formalin, were completely rotten by the end of September. By employing the method of treatment described, pitted or slightly diseased apples can be kept in a condition fit for use for several weeks longer than when no treatment is applied. This is a point of importance both to grower and fruit dealer. In the case of householders, and others who store a quantity of apples for winter use, it would well repay the very small trouble incurred to treat apples previous to storing. The method is simple, put ten gallons of water (preferably rain water) into a cask or zinc bath; add three pints of formalin, mix thoroughly;

then immerse as many apples contained in a net or loosely-woven sack, as the water will cover. The fruit after remaining in the solution for ten minutes, the sack being partly lifted up to ensure every part of its contents coming in contact with the liquid should be removed from the sack and placed on a layer of straw, hay, or some suitable substance to drain and dry. It is not necessary to immerse in water, after their removal from the formalin mixture apples that are intended for storing. Plums, strawberries and other soft fruits should be placed in a sieve or some such firm open structure for immersion in the solution. The strength of the formalin solution does not deteriorate by use, so that the process of sterilizing batch after batch of fruit, can be continued until the solution is practically used up in the process.

FOR TROPICAL FRUITS.

However valuable the method of fruit preservation described here may be in extending the duration of ripe fruit in good condition for local use, the greatest benefit, will be in connection with export fruit. Many kinds of tropical fruits, which owing to their rapid deterioration and decay are never sent on long journeys, could be exported if treated in this manner before shipment. The fact that many tropical fruits decay very quickly in their native country is, in reality, no argument against the suggestion. It only indicates that in the warmer countries, as in every other land, the surface of every ripe fruit is loaded with spores of fungi, wild yeasts, etc., which attack the tissues and set up a fermentation that is often mistaken for the normal decay due to over-ripeness. As an example the state of semi-decay in which bunches of bananas frequently reach England is, in most instances, entirely due to the attacks of various superficial organisms capable of inducing fermentation. This could be prevented by the adoption at the port of shipment of the treatment recommended above.

COMMERCE AND INDUSTRIES.

Forest Research and Experiments in the Bombay Presidency.

The following extracts are taken from the Administration Report of the Forest Circles in the Bombay Presidency (including Sind) for 1918-19 :—

NORTHERN CIRCLE.

Tarwad (*Cassia auriculata*) propagation was continued. 21.5 tons of seed in 1918 and 9.75 tons in 1919 were collected and distributed to various places within and beyond the Presidency—a most creditable performance. In the circle 1,110 acres in 1918 and 167 acres in 1919 were completely sown with seed and 8,887 acres in 1918 and 4,900 acres in 1919 were partially sown by various methods in the Panch Mahals, Surat, North Nasik and West Nasik Divisions, the other divisions being not suitable to it. The results are reported to be good. 50 per cent of the seed sown last year lay dormant and germinated this year and 75 per cent of that sown in 1919 came up plants being 2 to 4 inches high and doing well.

Rosha oil.—A portable steam double still was experimentally erected in North Nasik. The only stuff available was poor and dry which ordinarily would not be used. This was treated and though the percentage of oil was low, the product was of better quality than the best oil by the country process.

Timber conversion.—A portable saw mill lent by the Executive Engineer, Nasik, was worked in Peint, as an experiment. The outturn was not satisfactory, owing to want of expert supervision. The establishment of two or three saw mills in these forests under expert assistance is very desirable for utilizing to the best advantage much inferior, stunted teak and junglewood material now going to waste.

CENTRAL CIRCLE.

Tarwad was sown in all the divisions except Kolaba with the same results as in the Northern Circle.

Of the Eucalyptis plants in North Khandesh mentioned last year, half were killed by white ants but those surviving are doing well. Also the Grevillea plants are reported to be growing well.

The work of Sallai (*Boswellia serrata*) tapping was continued in the same division and 3 cwts. of Gum-oleo-resin were supplied to the Institute at Bangalore and 4 cwts. to the Eastern Development Company, Limited, Bombay, for experiment; tapping is still being continued to meet further demand of the company.

The Divi-divi (*Cesalpinia coriaria*) seedlings transplanted in the preceding year in Kolaba are doing well.

SOUTHERN CIRCLE.

Tarwad was also sown in the dry parts of this circle with no good results owing to severe drought.

The experiment of sowing teak after clear felling and burning in the Kanara High forests was promising but with a partial failure due to the same cause.

Samples of fibre from Tali-palm (*Corypha umbraculifera*) leaf stalks forwarded by Mr. M. S. Tuggerse from Mahime forests in Southern Division, Kanara, were sent to the Director of Industries and to Dehra Dun. This fibre has since been reported on by commercial experts as being full of promise and further enquiries are going on.

SIND CIRCLE.

The Divi-divi plants put out last year in Sukkur are doing well. The *tarwad* sowing was carried out as last year with partial failure owing to frost to which the plant is very susceptible. The propagation of lac was continued but no marked results were obtained.

GENERAL.

(1) *Woods suitable for rifle stocks*.—The two species *Terminalia tomentosa* and *Pterocarpus Marsupium*, which have been pronounced as likely to be suitable for the manufacture of rifle stocks, are both found in sufficiently large quantities in the Northern and Southern Circles and at one time the Indian Munitions Board had intended for a supply of a hundred tons for the purpose. Seasoning experiments have been undertaken in the Southern Circle and results are still awaited.

(2) *Woods suitable for embossing work*.—At the instance of Messrs. A. Willing and Company, Bombay, the Director of Industries made enquiry about woods suitable for embossing work. The following species which are found in this Presidency have been recommended for trial:—

Adina cordifolia; *Stephegyne parvifolia*; *Chick-rassia tabularis*; *Cedrela Toona*; *Odina Wodier*; *Gmelina arborea*; *Dillenia pentagyna*; *Hollarhena antidysenterica*.

(3) *Woods suitable for brush-making*.—Messrs. H. Bevis & Co. of Cawnpore having made enquiries about woods suitable for brush-making, samples of—

Holarrhena antidysenterica,
Carallia integririma,
Canthium umbellatum,

were supplied. Results are awaited.

(4) *Woods suitable for making "Gur" cases*.—The Director of Industries made enquiry about

woods suitable for making "Gur" cases and tea-chests. *Terminalia paniculata* was recommended and approved. Arrangements for cutting up this wood and supplying "Gur" cases have been made in the Kanara Central Division, Southern Circle. This wood occurs in large quantity and of great size in the Kanara forests and is not much in demand for anything else. It hardly pays to bring it in logs to depot for local demand.

(5) *Woods and nuts suitable for button-making*.—Fruits of *Corypha umbraculifera* (vernacular "Tale"; the Umbrella Palm) which is plentiful in Kanara Southern Division, and woods such as *Dalbergia Sissoo*, *Santalum album* (Sandal), *Memecylon edule*, etc., have been recommended as suitable for the manufacture of buttons in response to a query from Mr. Dyer, Mechanical Engineer to the Government of Bombay.

(6) *Crewia tiliæfolia* which is available in large quantity in Kanara and Belgaum was experimentally supplied, tested and found suitable for aeroplanes but trees yielding sufficiently flawless trunks being very scarce, there was no actual order for it from the Munitions. The same species is recommended to the Director of Industries as suitable for making casks as containers of vegetable oil.

(7) *Cesalpinia brevifolia*, the pods of which are known to contain 50 per cent tannin and to have a tannin value superior to Divi-divi *Cesalpinia coriaria* has been recommended for experimental cultivation in dry regions. Seeds supplied by the President, Forest Research Institute, Dehra Dun, have been sent to all the circles for being tested in dry localities. The first available harvest of pods will be sent to the Forest Research Institute, Dehra Dun, for valuation of their tannin-contents and then the feasibility or otherwise of their cultivation on a commercial scale in the successful regions will be considered.

(8) *Tarwad*.—As regards the cultivation of *Tarwad* experimental sowing made in all the circles in 1918 were not encouraging owing to the failure of rains in the Northern and Southern Circles and to excessive frost in Sind; however, fresh sowing have again been made in 1919 and, judging by the results after normal rains, it will be possible to form a fair idea before the close of the present year regarding the advisability of proceeding with the cultivation on a large scale.

(9) *Lac propagation*.—The system of exploitation through contract agency in Sind having proved defective, as in that no measures were taken to ensure the future crops and to propagate the lac, departmental collection is being tried. Mr. C. M. Harlow of the Indian Forest Service who has been

appointed by the Government of India to conduct an enquiry into the lac industry is to visit the lac districts in Sind during the current cold weather. The results of his enquiry will be awaited.

(10) Samples of the following fibre plants have been supplied to the Director of Industries for experimental purposes :—

1. *Sida rhombifolia*.
2. *Sida acutifolia*.
3. *Hibiscus cannabinus*.
4. *Thespesia Lampas*.
5. *Thespesia populnea*.
6. *Kydia calycina*.
7. *Bombax malabaricum*.
8. *Sterculia urens*.
9. *Sterculia colorata*.
10. *Sterculia guttata*.
11. *Helicteres isora*.
12. *Friolœna Candollei*.
13. *Grewia ilicifolia*.
14. *Erinocarpus Nimmoanus*,
15. *Crotolaria juncea*.
16. *Spatholobus Roxburghii*.
17. *Butea frondosa*.
18. *Butea superba*.
19. *Bauhinia racemosa*.
20. *Bauhinia Vahlia*.
21. *Bauhinia malabarica*.
22. *Bauhinia variagata*.
23. *Albizzia stipulata*.
24. *Hardiwickia binata*.
25. *Careya arborea*.
26. *Casaria glomerata*.
27. *Calotropis procera*.
28. *Cordia Myxa*.
29. *Ipomœa Turpethum*.
30. *Dolichandrone falcata*.
31. *Alœ*.
32. *Ficus rumphii*.
33. *Trema orientalis*.
34. *Saccharum arundinaceum*.

Results are awaited.

(11) *Bamboo pulp paper industry*.—The Kanara District is reserved for the scope of experiments by a syndicate under the management of Messrs. Turner Morrison & Co. of Bombay as to the possibilities of the manufacture of bamboo paper pulp on a commercial basis for a period of two years.

PREPARATION OF BEESWAX.

In an interesting article the *Jamaica Agricultural Societies' Journal* says :—

Modern methods of bee-culture, as adopted in most European countries, Australia, the United States of America and elsewhere, have for their primary object the production of honey, since the latter realises a better price than wax. In former times when bees were kept in "skeps" or boxes a large number of swarms were destroyed annually, and the whole of the comb, after the honey had been extracted, was converted into wax. As one result of the use of moveable box hives it is no longer necessary to destroy all the comb, but merely to remove the cell-capping and extract the honey by means of a machine. The empty comb can then be returned to the hive and re-filled. As bees consume a large quantity of honey in order to make wax, the modern bee-keeper effects a considerable saving in this respect by using the same comb several times. This practice, however, withholds a considerable quantity of wax from the market. The modern custom of retailing honey in the comb, owing to the ease with which extracted honey can be adulterated, likewise prevents a quantity of wax from finding its way to the market as such.

In consequence of the inability of European and other countries where modern methods of bee-culture are practised, to meet the increasing demands of manufacturers for this product, the markets have come to depend more and more for their supplies on countries where the wax produced by wild bees is collected and exported. This industry is at the present time attracting a considerable amount of attention, especially in Eastern, Central, and Western Africa, and for that reason it is of interest to give some account of the methods adopted in preparing beeswax for the market.

Wild wax seldom equals the cultivated product in quality, and this is frequently due to careless methods of preparing it for export, and to adulteration. By paying more attention to the few simple details connected with the process of preparing beeswax for export, it would be possible to produce wax from wild bees almost equal in quality to the European article and which would command a similar price on the market.

There are several methods of "rendering" wax, as the process of separating wax from honey and impurities is termed, and in some countries special appliances are in-use for this purpose. In many cases, however, these appliances are too delicate or too complicated in structure for native use and in such countries one or other of the following simple methods is recommended.

The melting of beeswax can be effected either by using sun heat, direct fire heat, boiling water or steam. In a melted state beeswax readily separates from such foreign substances as may be contained in it, and owing to its lower specific gravity will float on the surface of the matter.

A simple method of rendering wax, and one formerly adopted by bee-keepers in this country and elsewhere is to extract as much honey as possible from the comb, first by draining and then by pressure in a press of the ordinary copying-press type, and finally by melting it in presence of water, which dissolves out any residual honey which may cling to the pressed wax. While melted, the wax is strained through calico to remove solid impurities, and is finally re-melted over a fire to remove water, after which it is poured into moulds to set. Care is required in carrying out the final melting as burning may occur, and when this happens a dark-coloured wax of low market value is produced.

Another method followed by bee-keepers who have not adopted modern appliances is to place the comb, after the honey has been extracted, in a canvas bag which is kept below the surface of water, contained in a copper or other large vessel, by being weighted with stones. If the comb contains "brood" it is allowed to soak in water for twenty-four hours before being placed in the copper, the object being to fill the dry cocoons with water, which will prevent them absorbing the melted wax. The water in the copper is next heated, and as the wax melts it passes through the canvas bag and rises to the surface of the water, leaving behind in the bag all solid impurities. The bag is then out of the copper and squeezed between two pieces of wood to extract as much wax as possible, and the surface of the melted wax in the copper is frequently skimmed to remove scum and other impurities. A cloth is then thrown over the vessel, and the wax and water allowed to cool as slowly as possible. The wax solidifies into a cake, which can easily be removed from the water. On the under side of the cake there is usually a discoloured layer containing impurities, and this is scraped off and worked up with the next batch of crude wax. The remainder is broken up into small pieces, re-melted and poured into moulds to set. Provided that care is taken (1) not to boil the water too fast or for too long a time, and (2) to prevent burning during the final melting, this method produces clean wax of good colour; but if either of these precautions be neglected it becomes dry and brittle, and of a brownish hue. The outfit required for the foregoing operations is simple and obtainable almost everywhere.

Of the modern appliances for rendering wax one of the simplest is the "Solar wax extractor," which is in common use in the United States, Australia, and elsewhere. This consists of a wooden box with a sloping double glazed lid. Inside the box, and raised some distance from its floor, an inclined tin tray is fixed. The comb is placed on the tray, the lid tightly closed, and the box exposed to the sun. The temperature inside the box rapidly rises, and when it reaches about 147 F. the wax melts and runs off the sloping tray into a vessel beneath, leaving impurities behind, caught by a wire gauze strainer. This appliance is admirably suited to warm countries, and wax obtained by its use is of good quality, and requires no further refining. It is, however, not

suitable for rendering comb containing brood or other gross impurities. In treating comb of this description it is best to extract the wax by one of the methods mentioned above, and then to clarify it by means of the "Solar extractor." Most of the other appliances are provided with a screw press by means of which the wax is forced through strainers after being melted by means of hot water or steam.

INDUSTRIAL LABORATORIES IN ITALY.

We take the following from the *Society of Arts Journal* :—

Appreciating the importance of applying scientific methods in its industrial development, if it is to solve successfully the great problems of reconstruction and to meet competition from other nations whose industries are more highly organized, Italy is devoting special attention to the questions of industrial experiment stations and of technical education. The necessity for such action is made more urgent by the adoption, in many industries, of an eight-hour day. If the working day be shortened to eight hours, increased efficiency in manufacturing methods must be brought about if production is to be maintained.

In this connection the Italian Government, together with the manufacturers, is establishing experiment stations for the principal lines of industry. In addition to studying new processes and making new applications of old methods, these stations will supply the industries with a trained *personnel*.

According to a report by the United States Trade Commissioner at Rome, four stations have been established—two at Milan, for paper and fats respectively, and two at Naples, for leather and ceramics. Another is being established at Reggio Calabria for essential oils and perfumes, and three more are to be established as follows: At Rovigno, for the sugar industry, in connection with the existing school of beet culture; at Milan, for the development of the refrigerating industry; a third, probably at Rome, to study the distillation of gases and their by-products, and, in general, all the processes of combustion. One section of this last-named station will devote itself to the question of the utilization of national fuels and lignite. Later on consideration will be given to the creation of stations, on the initiative of the manufacturers, for the electro-technical and photo-technical industries and for dyestuffs.

In order that the standard of vocational education might be raised, provision was made at the end of 1918 for the establishment of laboratory schools. At first there will be twenty of these schools, of which two will be at Milan. In addition to a Government subsidy of 25,000 lire each, the laboratory schools will receive appropriations from the local authorities and the obligatory support of the manufacturers. The schools established during the war at Turin, Milan, Genoa, Modena, Florence, Rome, Naples, and Palermo, will be transformed into laboratory schools. Provision will also be made for the ordinary industrial schools, in all of which short courses of study, both practical and theoretical, will be instituted.

BOOKS IN BRIEF.

Industry and Finance—(*Supplementary Volume*). Edited by Adam W. Kirkaldy, M.A. Published by Authority of the Council of the British Association—Sir Isaac Pitman & Sons. Ltd., London, E. C. 4.

This supplementary volume containing the results of inquiries arranged by the Section of Economic Science and Statistics of the British Association during the years 1918 and 1919 has been edited by Mr. Kirkaldy with great care. It adds to and brings up-to-date to the volume published in 1918 regarding the replacement of men by women in industry, and the chronological account of events connected with currency and banking. The volume is divided into two sections—the first being made up of five chapters—one devoted to a general survey of replacement of men by women in industry, another to replacement in the engineering and metal trades, a third to replacement in the clothing trades, a fourth to replacement in communication and transport, and the fifth to a consideration of the position of women in industry. Section II has likewise five chapters—one being devoted to the banking position, the second to currency, the third to foreign exchanges, the fourth to War Finance and the fifth to the results of inflation. The book is one that every student of current Economics should possess.

John Murray III—1808-1892.—*A Brief Memoir by John Murray IV*—Published by John Murray—Price 3sh. 6d. net.

We have in this book drawn for us a very pleasing picture of John Murray III, the father of the present head of the great firm of publishers, under whom the house flourished and became even better known. His business instinct, his literary tastes, his many friendships and a great many other things are referred to by Mr. John Murray in a manner which is both happy and informing. John Murray III interests us because he was so human in his traits. His business led him into literary friendships and these proved of a life-long kind. Mr. Murray's "Guides" were his invention and we can say of his Indian Guide by Eastwick that it is a model of its kind. We have tested it most closely and it has never failed. It should be news to many that Baedeker's *Guides* were modelled on his. This is proved conclusively in Mr. Murray's article on the subject extracted in this volume. Mr. Murray has, we think, done well in reproducing his "Quarterly" article in book form. He has by doing so not only discharged a filial but also a public duty.

Forty-four Months in Germany and Turkey. By Har Dayal, M.A. Published by P. S. King & Son, Ltd., Westminster, London.

This is a book of impressions by an extreme Indian, who spent the major part of the War period in Germany and Turkey. He depicts in terms pretty plain what he thinks of the people of these two countries. It is impossible to read this book how easily men can be misguided. It is, however, something that recantation is not considered impossible even by them.

The current number of the *Bulletin of the Imperial Institute* (John Murray) discusses in detail the possibility of utilising the large quantity of seed now being produced on rubber plantations. In the early stages of the rubber industry in the Middle East the seeds were mostly used for raising plants for making new plantations, but as there are now at least 1,000,000 acres under rubber trees the quantity of seed available is much in excess of the planting requirements. It was shown many years ago by investigations made at the Imperial Institute that the kernels of Para rubber seeds yield a large amount of oil similar in properties to linseed oil and that oil can be used for paint-making and other purposes for which linseed oil is employed, whilst the cake which is left after the oil has been removed from the kernels is an excellent feeding-stuff for live-stock. Until the last year or two, the oil had only been produced on an experimental scale, but at least one oil mill is now established in Malaya for crushing rubber seeds and small commercial consignments of the oil have been sold recently in this country and in Marseilles at good prices. Whether it will pay the planter to supply the seeds to an oil mill depends very largely on the cost of collection, a point on which experts differ. In view of the present necessity for the exercise of rigid economy on rubber estates and of the enormous demand for oils and feeding-stuffs, it is highly desirable that serious efforts should be made to organize the collection of Para rubber seed wherever it is likely to prove at all profitable and so prevent waste of material which is undoubtedly of considerable value.

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WHERE WE MUST NOT ECONOMISE.

BY B. SEEBOHM ROWNTREE,

Author of *Land and Labour*, etc.

WHEN a business is passing through a period of acute strain and financial stress, a period so critical that its managers cannot afford to make even trivial blunders, a wise firm will do its utmost to eliminate all waste. The management will ruthlessly scrap all effete or slipshod methods, and organize the enterprise with a view to utilizing every ounce of raw material, every hour of the working day, and every fraction of human effort. The slightest leakage will be detected, and promptly remedied, while much expenditure which might have been permissible in prosperous times will be tabooed.

And yet, the more prudent the members of the management, the less they will be tempted to cut down any expenditure that is essential to the life and soul of the business, and to its industrial future. They will scrap no improvement (such as the introduction of a costing system, or the appointment at a high salary of a first-rate chemist) which more than pays its way in increased business efficiency. In short, they will discriminate unerringly between wise though ample outlay, and extravagance or waste.

Now, the State is really a giant firm, which runs a wonderfully vast and complicated business, and which must adjust its

outlook, not only to the needs of the community to-day, but to needs which will arise twenty years hence. Therefore, like the business management, in this period of acute national stress, it will drastically check all waste. But it will never fail to distinguish clearly between a wasteful policy, and one of liberal, but judicious expenditure. From the national standpoint, all economies should be condemned which, although they reduce or check expenditure in some directions, do this by methods which handicap the community as a whole, and militate against its mental, physical, or moral welfare. Let us consider some of these false economies.

First of all we must taboo any policy which penalises education. Our motto with regard to education should be: Look after the nation's brain-power, and the nation's wealth will look after itself."

POWER IN THE HANDS OF THE • WORKERS.

There are grave reasons why progressive and generous methods should be adopted in this connection. The workers are taking more power into their own hands, day by day, not only in the world of politics but that of industry. The phrase "Government by the people, of the people, for the people" will soon be transferred from the realm of vague ideals into the welter of practical life, with its infinite complexities, and its world-wide entanglements. Now, will it represent the government by intelligent people of other intelligent people, for their mutual benefit? Or will the blind lead the blind,

as they have so often done in the past? The answer to that question depends upon the equipment which the workers are receiving to-day. Are they, or are they not, learning to use power wisely? Are they acquiring a mental training which will at least enable them to choose leaders who are leaders indeed? Again, are they gaining a historical perspective, and some knowledge of the evolution and structure of present-day industry and economics? It is of supreme importance that masters should be acquainted, for example, with the enthralling, and often tragic, history of the Trade Union movement. But it is no less important that the men should learn to see in the masters beings, who, like themselves, are largely in the grip of circumstances over which they have but a faint shadow of control. The gulf between conflicting interests and prejudices can only be bridged by the comprehension that comes from wide knowledge and ideals that transcend the individual or the group.

In the second place, we must not economise by unduly restricting our provisions for the economic security of the workers. There are many reasons for refusing to adopt a cheeseparing policy in this connection. I will only criticise it from the standpoint of productivity. The need to increase our national output is imperative in the last degree, and the effect upon output of a widespread sense of insecurity in the ranks of labour is disastrous. So long as workers are liable to be flung out of work without adequate resources for their own maintenance or that of their dependants, so long will the ca' canny policy find millions of adherents. In this connection, I may say that the provisions of the present Unemployment Act are quite inadequate. We need a scheme more radical and more far-reaching before we can cope with the "menace of unemployment."

FOUR EXPENSIVE ECONOMIES.

In the third place, we must shun all measures that affect the health of the community

adversely. I may mention four spheres in which the results of a false economy are especially harmful.

- (a) Housing.
- (b) Wages.
- (c) Medical and hygienic provisions.
- (d) Temperance reform.

(a) Some people say that "we cannot afford to build good houses for the workers." My answer is that far less can we afford to leave them without houses much longer, or to build them bad ones. There are far too many thousands of bad houses already, houses which, even if not technically insani-tary, are inadequate from the mere stand-point of physical requirements. In the future, the house of the rank and file worker must be sunnier and more spacious, more convenient in every way, and better suited to his growing mental and social requirements. If possible, it must have a garden. Space forbids me to say half I should like to say on this point. But a garden is not only a storehouse of fresh fruit and vegetables. It is Dame Nature's sanatorium, her rest-home for the jaded worker, and her unfailing "counter attraction" to allurements more costly, but less sane.

Of course, in connection with housing, here are great possibilities of wise economy. We can economise, for instance, by putting an end to profiteering, whether among those who supply raw materials or those who build—masters or men.

(b) I will not dwell on the evil results of economies which involve a rate of wages below the figure necessary to maintain the workers in physical efficiency. From the national point of view, such "economies" only mean that outlay in the right direction is being diminished at the cost of a vastly increased outlay in the wrong direction. We are as it were, robbing Peter of sixpence to pay Paul a bad penny. An inadequate scale of wages means a heavier burden on the taxpayer. It means general inefficiency,

and shortage of national output. It means a high rate of infantile mortality. It means parish relief, or the workhouse, for many thousands of men and women who should be self-supporting in any wisely ordered community.

THE HEALTH OF THE NATION.

(c) We must not make economy our watch-word in connection with preventive and remedial measures destined to safeguard the national health. When, as a community, we promote the actual vigour and fitness of human lives, whether we establish clinics, or sanatoria, or provide maternity benefit, or Infant Welfare Centres, we are, in effect, buying "Health Bonds." And that bed-rock investment ensures all our other investment.

(d) I believe that our present hesitation to put the liquor traffic under national control arises very largely from the prevalent false perspective in the matter of economy. Some people say that any scheme of State Purchase is "economically unsound." It is true that such people seldom approach the problem with academic calm. It is also pretty certain that they have not thought out its pros and cons, nor studied, for example, the famous Carlisle experiment. But, do they consider that the present system, which actually puts a premium on the vice, disease, and suffering that are inseparable from the excessive consumption of alcohol, is economically sound? Any policy that tends to sap, not only the physical, but the moral fibre of a nation—however lucrative it may seem—is economically indefensible, and any policy that raises the general level of efficiency and integrity is "economically sound," although it may involve some slight initial risk, or even loss.

Finally, with regard to every proposed economy, or to any proposed expenditure, we should, I think, honestly ask ourselves the following questions:

"Will the policy in question, viewed from the standpoint of the whole community, and over a number of years, enrich human life, or impoverish and waste it? Will it help us and those who come after us to build up a better world—a world of justice, comradeship, and high achievement? Or will it mortgage the nation's future to serve the private ends of a group, or a party, to-day?"

AGRICULTURE IN MYSORE, 1918-19.

By "RUSTICUS."

WE cannot but think that the Report of the Mysore Agricultural Department, interesting as it is, would be even more so, especially to readers outside the Mysore State, if it were a little less disconnected. We could wish that its 177 sections had been reduced to about one-third that number. This, however, is a minor blemish and we consider that the Agricultural Department is to be congratulated on the excellent year's work it accomplished in spite of the discouragement of the influenza epidemic and the unfavourable season. It should perhaps be mentioned that, although the Report was written by Dr. Coleman, he was absent on well-earned leave during the greater part of the year, Mr. H. V. Krishnayya officiating for him.

The outstanding feature of the year's work was work which had not previously fallen to the lot of the Department, the distribution of seed grain on a large scale. The monsoon of 1918 was a great disappointment all over India and heroic measures were necessary to meet the situation. The object of the Agricultural Department was to secure a rapid increase in the stock of food grains by the growth of short duration crops with the assistance of the supplies of water, limited though they were, which the late rains of 1918 had brought and of an intermediate food crop in channel areas before the main paddy crop. The work was subsequently extended to the distribution of seed grains for the sowings in the main agricultural season of last year as it was found that supplies obtainable in the ordinary way were in serious defect. Dr. Coleman estimates that the result was sixty thousand pallas of grain worth Rs. 6 lakhs and nine thousand tons of fodder worth Rs. 2½ lakhs. He considers

that, of this total of Rs. 8½ lakhs, 75 per cent or Rs. 610,000 may be credited to the special efforts of his Department. The claim is a reasonable one for it is clear that the crops for which the seed was originally distributed would not have been grown at all but for the activities of the Department and that a large area would not have been cultivated in 1919 had it not supplied the seed.

The recent visit of the Indian Sugar Committee to Mysore lends special interest to the work of the Department on sugar-cane. The Committee must have found their visit to the Hebbal farm an instructive one for they saw there what can be done in India, given the right varieties of cane under proper cultivation. Red Mauritius, which, as in previous years, headed the list in the varietal tests, gave a yield of 392 maunds of jaggery. The maund is, we presume, the usual Mysore maund of 28 pounds so that this represents a yield of nearly 5 tons of jaggery per acre. The average yield of jaggery for all India is, we believe, somewhere in the neighbourhood of a ton an acre! But even better results than this can be secured by the application of the right amount of manure. When three tons of honge cake were applied, the yield amounted to 455 maunds. With three tons of castor cake, it reached 468 maunds. Castor cake is, however, more expensive than honge cake and the net value of the jaggery in the two cases only differed by a rupee, the figures being Rs. 844 and Rs. 843 respectively. The work of the Department in demonstrating the profitableness of the cane crop did not end there. Its experiments showed that the heaviest yield was obtained when the rows of cane were four feet apart and not two or three feet apart as the ryot prefers them. The saving of sets—a heavy item in cane cultivation—resulting from the wider spacing will be obvious. Hebbal is not content with testing varieties of cane obtained from abroad or from other parts of India against the local varieties. It is breeding its own canes and ten of its seedlings appeared better

than the Red Mauritius variety. These are being tested on the other farms and three of them,—H. M. 315, H. M. 14 and H. M. 303—we give their labels so that our readers may follow their history in future years—have done well both at Marthur and Babbur. At the latter farm, as at Hebbal, in the ordinary tests, Red Mauritius proved the heaviest yielder and gave 23·50 tons of cane to the acre over 6½ acres against 10·16 tons of the local variety, Rasthali, on the same area. The farm at Nagenahalli which is intended for cane is still unable to grow that crop owing to irrigation difficulties but it is hoped to make a beginning this year. Work on the farms is, of course, of little use unless its results are visible in the districts and it is satisfactory to find that Red Mauritius is now well established in all the important sugar-cane areas. Over 1,100,000 sets of it were distributed last year. This looks a formidable figure but we believe we are correct in saying that it is only sufficient for between 100 and 200 acres. An appreciable area must, however, have been planted with sets obtained by cultivators to whom the variety had been given out in previous years. Along with the spread of improved varieties and improved methods of collection, the Agricultural Department is promoting the spread of improved methods of extraction. The three roller Nahan mill is making rapid headway but unfortunately the supply was not equal to the demand and, even more unfortunately, the efforts of the Public Works Central Industrial Workshop to supplement it were unsuccessful, its mills proving so unsatisfactory that they had to be withdrawn.

A complaint which has frequently been made against the Agricultural Department in British India and is not without justification is that it has devoted its attention too exclusively to sugar-cane, wheat, cotton and rice and has left important crops such as jola (the juar of Northern India and the cholam of Madras) and ragi which figure largely in the dietary of large masses of the Indian

population almost entirely alone. That is not the case in Mysore where ragi is a crop on which much work has been done. The strain selected at Hebbal is now sufficiently fixed to justify trial and multiplication on a field scale. It was hoped that 200,000 seers of seed would be available for the season of 1919 but owing to the failure of the monsoon nothing was forthcoming from Doddaballapur which was to have been the main source of supply. Where the strain had a chance, it did well and its uniform growth and well filled earheads presented a marked contrast with the local varieties. A great demand for seed has sprung up in the neighbourhood of Hebbal. This is not, as might be thought, due to the fact that the ryots are impressed by the excellence of the crops on the Hebbal farm. Nothing of the kind! One enterprising ryot tried the improved seed and the excellence of his field so impressed neighbours that they are anxious to follow his example. This is another illustration of the truism, which, however, it took the Agricultural Department all over India a long time to realize, that the ryot is the best demonstrator. Get hold of an intelligent ryot and persuade him to try improved varieties or improved methods and others will soon follow his example. Demonstration farms are necessary, as are books of reference, but the secret of success lies in demonstrating what can be done on the cultivators' own land under his conditions.

Of the other work on the farms it is unnecessary to say much, especially as progress was so hampered by the unfavourable agricultural conditions. Cambodia cotton is spreading as the result of the work at Babbur. Tried against the local variety, Doddahatti, it gave a disappointing yield, only $8\frac{1}{2}$ maunds an acre against 21. It would have been interesting to know on what soil it was grown, black or red, as Madras experience is that on irrigated red soils, Cambodia gives about twice the yield of unirrigated land.

The demand for improved agricultural implements is growing apace all over India. Now that we are approaching, however slowly, conditions which may be regarded as normal in the post-war era, we hope it will not be long before the melancholy cry in all agricultural reports that the demand exceeds the supply will cease to be heard. The manufacture of such implements is a branch of activity to which Indian capitalists might well turn their attention. It would, we are convinced, prove more profitable and more beneficial to the country than many of the ventures on which they have recently embarked. There is no reason whatever why India should not be able to help herself to a far greater extent than she does at present. In all the circumstances, the Mysore Department did well to sell 1,038 ploughs and 62 cultivators during the year, in addition to 1,779 spare parts. The value of the implements sold was over Rs. 38,000.

It is interesting to speculate on the increase in the outturn of crops in India which might be secured by a judicious use of manures. It would, we have little doubt, solve the food problems which are pressing so hardly on the world at the present time. There is certainly no more important question before the Agricultural Department in India than this and the fringe of it has hardly been touched. The Mysore Department is doing what it can. About 6,000 seers of green manure seed, 14 tons of special mixture for paddy and 48 tons of oil cake were issued during the year. The oil was used mainly for the cane crop and it is mentioned in the Report that, whilst the price of oil cake has nearly doubled and the cost of mills, pans and labour has increased enormously, there has been no alteration in the price of jaggery. Matters have altered considerably in this respect since the Report was written but the cane cultivator would undoubtedly have reaped a richer financial harvest if his crop had been sold for conversion into sugar.

We are glad to see signs of closer co-operation between the Agricultural and Co-ope-

rative Departments. Nineteen co-operative societies were supplied during the year with implements, seeds and manures to the value of Rs. 1,541. This is a small amount but it represents a beginning and there is every reason to believe that the example of the nineteen societies will soon be followed by others, especially as the Registrar of Co-operative Societies has detailed an inspector solely for the work and the Agricultural Department has lent a fieldman to assist the societies.

The useful work which was done in the Chemical, Mycological and Entomological Sections was mainly a continuation of that of previous years. Both the two former sections were engaged in investigating the spike disease of sandal but it cannot be said that the investigation made great progress unless the discovery that spiked sandal leaves are deficient in nitrogen leads to anything. The Mycological Section is making good progress in stamping out the Koleroga disease of areca palms in spite of the handicap due to the difficulty of obtaining sprayers. If the Entomological Section succeeds, as it hopes, in perfecting the very simple remedy it has discovered against sugar-cane borer it will have done a most valuable piece of work, for borer is by no means confined to Mysore and is, in fact, the most serious pest of cane to be found in India. The work of the Botanical Section on cane and ragi has already been mentioned. This section is also doing good work on cotton and though its selection work on this crop is hardly likely to prove as fruitful as it has in the case of *karunganni* in Tinnevely or 4 f. in the Punjab, it may lead to valuable results for, though cotton is hardly one of the important crops in Mysore, the area under it is by no means negligible. We are glad to see that it has been arranged to make a collection of the varieties of jola grown in the State and to study their characters. As we mentioned above, this is a crop which has been unduly neglected.

Influenza interfered seriously with the work of the two agricultural schools in

Mysore, the Hebbal School and the Chikkanahalli Vernacular School. Only one of the thirteen students who sat for the final examination at Hebbal failed to pass. This is satisfactory enough but it is not so satisfactory that some of the students have fallen out by the way as they find residence on the farm too expensive. The Government review suggests that the value of the scholarships granted by the District and Taluk Committees, which are only from Rs. 3 to Rs. 10 per mensem, should be raised. Everything else has gone up in India and it is only reasonable that scholarships should be increased in proportion. Chikkanahalli had only eleven students last year but that the work it is doing is appreciated is shown by the fact that there were over 100 applications for admission for 1919-20. The number of students for whom room was found was consequently increased to seventeen.

Dr. Coleman, as usual, gives an estimate, necessarily a very rough one, of the direct financial results of the work of the Department. He considers that the improved tillage implements sold during the year gave the agriculturists an increased yield, the value of which was Rs. 70,000 and the cultivation of improved strains of ragi Rs. 20,000. The application of oil cake must have meant an extra profit of Rs. 75,000 and the use of better seed, presumably cane seed is meant and better milling and boiling methods, another Rs. 13,000. The increase due to other work of a miscellaneous character such as the extension of single seedling transplantation of paddy, green manuring and distribution of seed for special crops such as cotton, ground nut, turmeric, etc., is placed at Rs. 15,000. The total for the usual work of the Department is thus Rs. 1,90,000. Add to this, the Rs. 6,10,000 claimed as the share of the Department in the results of the scheme for the increase of food production and we get a total of exactly Rs. 8 lakhs. The estimate is, in our opinion, a very conservative one. It is also as usual impossible to compare the value of the work done by the Department with the amount spent on it as the Report fails to give figures for the latter but that the Department paid for itself several times over we have no doubt, and, as Dr. Coleman truly says, the effect of its work is cumulative and does not disappear with every passing year.

SILK FILATURE FOR MYSORE.

BY N. RAMA RAO, B.A., B.L.,

Superintendent of Sericulture, Mysore.

THE area under mulberry in the Mysore State is about 45,000 acres, and the cocoon yield approximately 10,000,000 lbs, capable of being reeled into about 7,50,000 lbs. of silk, and giving a by-product of about 300,000 lbs. of silk waste. Taking the present value of silk at Rs. 14 a pound and of waste at 12 annas, the value of the silk product of the State is considerably over a crore of rupees, and the industry in its several branches involves the welfare of over a lakh and a half of people.

The State enjoys special advantages for silk production in its climate and internal economy, and the industry if fostered, is sure to grow to several times its present size. The world's demand for silk is fast outgrowing its supply, and prosperity is assured to the country which can produce this valuable article on a large scale. Our industry is handicapped by two great drawbacks—a bad organization which deprives the rearers of their just share of profit, and a poor and limited market, which deprives the country of its place among the silk producers of the world.

I shall not touch on the problems of seed supply and improvement of rearing technique which are being grappled with by the Department. I shall refer to the economic weakness of the rearer only to say that it places him at the mercy of petty money-lenders, and fetters his freedom of sale, and to premise that his efficiency as a producer would be greatly increased if he were assured of an open market, and fair dealing.

The only way of vindicating our claim to profit by the world's growing demand for

silk, and of rescuing the workers from the tyranny of usurers is to establish a filature. The establishment of a filature is, therefore, lifted from a mere matter of private gain into one of high national importance.

Experiments have proved that rather more than 40 per cent of an average cocoon crop can be made into the finest silk, and that the remainder, if separated from specially bad cocoons (which amount to about 10 per cent), can be made into silk much superior to the bulk of the article now produced. This involves sorting—which is never done at present. Good, bad and indifferent cocoons are confounded together into a very inferior silk, quite unfit for use with machinery. Tests of Mysore silk, in France disclosed how material of excellent natural quality is being ruined by bad reeling. Even in our traditional markets, our expensive and ill reeled silk is being rudely hustled by a low grade Chinese article, which can afford to sell cheap, because much of the profit has already been made by the better grades.

There is no doubt that Mysore deprives itself at present of at least Rs. 3 for every pound of silk it sells.

There is yet another and even more important aspect of the question. The reeler, who is the rearer's market, makes no difference between good and bad cocoons in reeling and therefore in price. This deprives the rearer of all incentive to improve the quality of his crop. A filature, with buying agencies distributed over the silk area, would alter all this; it would organize the rearers in the villages into Co-operative Associations for production and sale, as this would be the most convenient way of dealing with them. Such associations would be most potent factors for progress, and industrial development.

The quantity of cocoons produced in the State at present is sufficient to keep about 2,500 basins at work throughout the year.

Making every allowance for the development of cottage reeling, and the continuance of the indigenous method for meeting local demand, there can be no doubt about the immediate scope for the establishment of filatures: and it must also be borne in mind that sericulture is growing very rapidly. In course of time there will probably be large filatures at Chikballapur, Bangalore, Channapatna, and T. Narasipur.

Just now a filature with 96 basins—consisting of 4 units of 24 basins—would be very suitable, as it would not be too large for a beginning, nor too small for being worked on a commercial scale. It is not meant that work should be started right off with these 96 basins; this size is only proposed as the most economical for initial installation. It would be best to begin with 10 basins, and expand to the full limit of the filature in a year, perfecting our technique, and organization at the same time. When all the 96 basins are at work, we might go on adding fresh units of 24 basins, till we have, say 240 basins, which is probably as much as a Superintendent can manage efficiently. The first filature, on whose successful working so much depends, might with advantage be located at Bangalore, where it can command the assistance of established industries and commercial organization.

The above statement of facts, constitutes, it is believed, a complete argument for the installation of filatures in Mysore. To summarise:—

Sericulture, for which we enjoy very great natural advantages, fills an important role in the economic life of the State, and affects the happiness and prosperity of a large section of our people. The demand for silk is steadily increasing throughout the world. Our organization is faulty both internally and externally; internally, because rearers and reelers work under conditions of great inefficiency; externally, because our silk

cannot get into the world's market. These defects not only confine the growth of the industry, but menace its very existence, by inviting aggressive, and to certain extent, successful competition from foreign countries. We have to improve not only to progress, but even to live. Such conditions would even justify a sacrifice, but the remedy proposed, far from involving a sacrifice is almost mathematically certain to bring a great, and ever growing addition to the national dividend. The establishment of filatures saves the economic loss due to making bad silk out of good cocoons, and by giving Mysore silk an unlimited market, secures to the Mysore agriculturist scope for developing his production to the full limit of his natural advantages. Immediately it rescues him from usurers, and gives him an interest in improving the quality of his production.

We are passing through an epoch of active industrial construction. It is hoped that the case for establishing filatures will receive the consideration its importance deserves from patriotic and enterprising men of business. They may like to know that investigations have been conducted to ascertain the type of plant suited for our raw material and labour conditions, and that valuable data have been collected and are available with the Sericultural department of the State.

INDIAN STUDENTS IN AUSTRALIA.

BY ALBERT J. SAUNDERS, M.A.,
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American College Madura, South India.

AT different times several of my students have asked me if Indian students may not go to Australia to complete their industrial or technical or university education. The argument they have advanced is a sound one and one very hard to answer. We may go, they have said, and are welcome to Europe, to England or Scotland, to America, but we may not go to Australia. In other words, we may go to the Mother of our British Empire, and be warmly welcomed by her as one of her children; but are refused a welcome to the home of one of the daughters. And yet we are all children or members of a common empire. In vain have I tried to explain the standard of living, the wages question, the labour situation which are bound up in the problem; there has nevertheless still remained the sense of discrimination and injustice with which I have always deeply sympathised. I have tried to reason to myself that there ought to be a distinction between the ordinary coolie whose advent in Australia would soon bring about a labour and wages problem, for the Australian could not compete in the labour market with the Indian, and the merchant and student whose sojourn in Australia would not upset the conditions of labour. International commerce and trade are growing between India and Australia, and it is only natural and right that Indian business houses and students should desire to send or go to Australia for their training for the sole purpose of developing trade relations between the two sister countries of the same great Empire. I wish to emphasise this point that I saw the injustice

of the former white Australia policy in reference to merchants and students, and ardently wished for some distinction to be made between the working coolie and the Indian student.

Being on a short visit to Australia I resolved to investigate the matter with special reference to Indian students, and I now make this formal report on the matter which I trust will be given wide publicity by the Press throughout India.

I took the matter up first with certain professors and students of the Universities of Melbourne and Sydney. My question to them was—will you welcome Indian technical and university students to your schools and universities? The answer came again and again—certainly we will welcome them, and would be glad to have them. Then fully understanding that this question is a Government matter, for it has reference to Australia's foreign policy, I obtained an interview with the Victorian State Minister of Education and the Director of Education. We had a long talk about the whole matter. They said that it was the first time that the matter had been brought to their attention, and as educationalists they would welcome the admission of Indian students to Victorian technical schools and higher educational institutions. But after all, they said, it was really a matter for the Federal Government to decide, and accordingly I was sent to the Immigration Department of the Federal Government of Australia.

Unfortunately I did not see the Prime Minister who was absent from the State at the time, but I had the opportunity of a long conference with two heads of departments, and they supplied me with the former and more recently amended Government orders on this question. I shall now proceed to lay before you the Government papers on the admission of Indian students to Australian institutions.

I need not go into the whole history of this question, for it has been the subject of

much consideration and action extending over many years, and it has been the occasion of a great deal of correspondence which is all preserved in State papers. I will however report three Government actions taken which will bring the matter up-to-date, and show how the question stands to-day :

I

IMMIGRATION RESTRICTION ACT 1901.

Extract from the correspondence respecting the proposal to modify the administration of the Act in regard to visits of Asiatic merchants, travellers, etc.—

(Dated 16th April, 1904 to 1st Aug. 1905)

Prime Minister,

Melbourne, 15th August 1904.

MY LORD,

I have the honour, at the instance of my colleague, the Minister of State for External affairs, to inform Your Excellency that he has had under consideration the question of so administering the Immigration Restriction Act as to afford an opportunity for Indian merchants, students, and tourist travellers to enter the Commonwealth temporarily without being subjected to any restrictions.

2. Mr. Hughes has now decided that any persons bonafide of the classes mentioned above desirous of visiting Australia, will be admitted to the Commonwealth, provided they are in possession of passports from the Indian Government sufficiently identifying them, and specifying the purpose and probable duration of their visit. Such documents will be accepted by this Government as entitling the holders to freely enter and pass through Australia, the only condition being that the passports shall be examined at the first port of call.

3. On arrival in the Commonwealth the education test prescribed by the Immigration Restriction Act will in these cases not be imposed, and such persons will be permitted to land without restriction, but, in the event of their wishing to stay longer than twelve months, an application for a certificate of

exemption for the desired term should be lodged before the expiry of such time, and the reason for such exemption stated. It must, of course, be understood that in any such cases none of the rights of the Government of the Commonwealth under the Immigration Restriction Act are to be considered as abandoned, and that, should it be found that this concession is being abused, the practice will be subject to review at any time.

4. An undertaking will be required from all such persons to advise the customs officer at the port of departure when they are about to leave the Commonwealth.

5. I shall be glad if Your Excellency will be so good as to communicate the contents of this Despatch to the Viceroy of India, and ask Lord Curzon to advise Your Excellency whether arrangements can be made in India accordingly. If there is no difficulty on this point, my colleague's proposals might take effect from an early date, say the 1st of October next. The Indian Government might take the necessary steps to give the requisite publicity to the matter at the seaports and principal towns of India.

6. It is hoped that this exemption will be the means of promoting intercourse and improving trade relations between the Commonwealth and the great Indian Empire.

I have, etc.

(Signed) J. C. WATSON.

His Excellency the Governor-General;
Commonwealth of Australia.

II.

Extract from Resolutions at the Imperial War Conference 1918 respecting reciprocity of treatment between India and the Dominions.

"1. It is an inherent junction of the government of the several committees of the British Commonwealth, including India, that each should enjoy complete control of the composition of its own population by

means of restrictions on immigration from any of the other communities.

"2. British citizens domiciled in any British country, including India, should be admitted into any other British country for visits, for the purpose of pleasure or commerce, including temporary residence for the purpose of education. The conditions of such visits should be regulated on the principle of reciprocity as follows:—

- (a) The right of the Government of India is recognized to enact laws which shall have the effect of subjecting British citizens domiciled in any other British country to the same conditions in visiting India as those imposed on Indians desiring to visit such country.
- (b) Such right of visit or temporary residence shall, in each individual case, be embodied in a passport or written permit issued by the country of domicile and subject to vise there by an officer appointed by and acting on behalf of the country to be visited, if such country so desires.
- (c) Such right shall not extend to a visit or temporary residence for labour purposes or to permanent settlement."

III.

Extract from a letter from the Prime Minister to the Governor-General, for transmission to the Secretary of State for the Colonies.

Dated 10th April 1919.

"With reference to the Secretary of State's letter of the 28th August, 1918, Dominions No. 476, I desire to inform Your Excellency that the documents transmitted have been considered, and ministers have had the advantage also of perusing the report of the conference dealing fully with the question of reciprocity of treatment between India and the Dominions.

"As far as Australia is concerned the position is that in 1904 the Commonwealth Government agreed to permit the admission of Indian merchants, students or tourists with their wives on passport for a period of one year, the question of subsequent stay to be considered on application.

In view of the resolution, and with the desire to give full effect to the spirit which animated the conference, the Government is now prepared to extend the former arrangement so as to permit Indian merchants, students and tourists to be admitted to Australia on passports, and to remain here (Australia) indefinitely without the need for further application, so long as they preserve the capacity in respect of which the passport was issued."

This in brief outline is the position as it stands to-day in reference to Indians, going to and remaining in Australia. Merchants, and by that term the Australian Government means not bazaarmen or small shop-keepers, but large traders and wholesale business men; students, including industrial and technical, college and university men, who wish to complete their education in Australia; and tourists may all freely go to Australia on a passport issued by the Indian Government and remain in Australia as long as they desire to provided only that they preserve the capacity (merchant, student or tourist) in respect of which the passport was issued to them.

This opens an unique opportunity to two classes especially of Indian men—merchants and students. It is only natural that Indian exporting business houses would desire their representatives in Australia, or those whom they wish to send as their representatives, trained in Australia. By that means they will get to know the country, the people, and the methods of Australian business. Then Australia offers a splendid opportunity for young Indian men to complete their education or technical training in the schools and colleges of a young and progressive country. The two outstanding advantages are—nearness to India, and consequently a saving in travel expenses; and a mild and delightful climate.

As time goes on it is hoped that many young men of India, either as merchants or students, will find their way to Australia, and thus help to bind together by means of commerce and education these two sections of the great British Empire.

BRITISH WAR ADMINISTRATION—A REVIEW.*

BY N. MADHAVA RAO, B.A., B.L.

THE late world conflict has shown, in a most striking manner, that wars in these days are not won by valour alone. To raise and equip huge armies, on the scale witnessed in the war, was not merely a question of recruiting or training, but one which involved numerous and possibly permanent adjustments in the social economy of the nations concerned. This aspect of the war is the subject of a series of studies undertaken at the instance of the Carnegie Endowment for International Peace. The volume before us deals with British war administration and is written by Dr. A. Fairlie, professor of Political Science, University of Illinois, the author of some well known books on American Administration.

THE PARLIAMENTARY SYSTEM.

From the beginning it was recognised on all sides that fundamental changes in the Parliamentary system of Government were inevitable, if military operations were to be vigorously and successfully prosecuted. But few could foresee at the time (and few understand fully even at the present day) the magnitude of the constitutional changes that were coming.

The patriotic resolve of the Unionists early in the war to suspend party hostilities involved the disappearance of the official opposition and the abandonment of the party system of Government, which had dominated the political arrangements of the country ever since 1832. This change in the constitution of Parliament was accompanied by an equally

remarkable change in its relation to the Executive. The exigencies of the war put an end to the constitutional fiction that the Cabinet is controlled by Parliament. It is true that there has been a large increase in the volume of legislation but the action of Parliament has been substantially that of passing the measures presented by the Executive Government, conferring with little or no hesitation, the enormous powers asked. Indeed the principal criticism made of the Cabinet, up to the end of 1916, was of its hesitation and delay in asking for legislative authority. In one important case, when the proposal for the second compulsory military service bill was first presented, the dissatisfaction in Parliament with its limited scope led to its withdrawal and the presentation of a more sweeping measure.

The free hand given to the Executive Government in regard to financial matters is even more remarkable. On August 6, 1914, a vote of credit for £100,000,000 was passed authorising expenditure for any war purpose, without specification or estimate, and this precedent was throughout followed during the war. The sums voted were as follows:—

1914—15	... £	362,000,000
1915—16	... £	1,420,000,000
1916—17	... £	2,010,000,000
1917—18	... £	2,450,000,000

It may be said without exaggeration that the Executive Government was given a blank cheque on the national purse.

Another significant instance of the control of the Cabinet over the Proceedings of the Parliament (the relation having been reversed) is furnished by a proposal made in February 1915, that the whole time of the House of Commons should be taken for Government measures until further notice—an extraordinary proposal which was accepted as a matter of course.

THE EXECUTIVE GOVERNMENT.

The Executive Government to which these powers were committed, it must be noted,

**British War Administration*.—By John A. Fairlie, Professor of Political Science, University of Illinois. Being No. 8 of the Preliminary Economic Studies of the War issued by the Carnegie Endowment for International Peace. Oxford University Press, New York.

was a radically different organization during the later years of the war from what it had been before. In the first place it was a Coalition which was more thoroughgoing than any known in history, including the prominent politicians of all the important parties, representing nearly 90 per cent of the House of Commons. Secondly the Executive included not only the political leaders but persons who belonged to no political party. The appointment of Lord Kitchener as Secretary of State for War involved a departure from established customs in two respects—in admitting to the Cabinet a non-party member and in placing a military officer at the head of the War Office. This principle of appointing ‘experts’ without party affiliations was greatly developed during the ministry of Lloyd George, when men like Sir Eric Geddes and Mr. H. A. L. Fisher were placed in charge of the important executive departments.

But the most important change remains yet to be noticed. The Cabinet had hitherto been composed of some 20 members in responsible charge of different departments of the public administration. Early in the war it was recognised that “a body of 23 members of very unequal ability, tired by their departmental labors and meeting every few days for a couple of hours was indeed an impossible machinery for making war.” The necessities of the times inevitably led to the formation of an Inner Cabinet to which, by common consent of the Cabinet, were delegated question of state and questions of strategy. In practice the Cabinet automatically ratified the decisions of the committee.

In the new Ministry of Lloyd George the traditional Cabinet of departmental heads taking a leading first in Parliamentary proceedings disappeared altogether. The Cabinet consisted of only five members who rarely attended Parliament and held no important portfolios. Relieved from the

duties of detailed administration and from Parliamentary drudgery, the members of this small Cabinet were enabled to give undivided attention to questions of policy and the direction of war measures.

Though the cabinet was thus reduced to the smallest size, the *Ministry* composed of the heads of Departments was greatly enlarged and consisted of a total of 88, nearly double the previous Ministries. The new Ministry included a Minister of Munitions, a Minister of Labor, a Food Controller, a Shipping Controller, Ministers of National Service and Reconstruction. These Ministers, freed from considering general questions of policy were expected to devote their time to the administrative duties of their respective offices, and, as stated already, some of them were men of business or experts rather than politicians.

Another constitutional development of first importance was the formation of what was called the Imperial Cabinet to which representatives from Colonies and India were admitted. This Cabinet, which is to meet annually as well as when occasion demands, may prove the nucleus of the constitution of an Imperial Commonwealth.

These constitutional changes, which more than one writer has called revolutionary, have been summed up by Mr. Sidney Low:—

“For the ministerial and administrative
“Cabinet collectively responsible to Parlia-
“ment, officered and recruited entirely from
“the Parliamentary circle, intimately related
“to the House of Commons, framed on rigid
“party lines, and conferring with absolute
“secrecy, we have a Cabinet which is
“not a Ministry and a Ministry which
“is not a Cabinet; a Cabinet which
“directs but does not administer; a
“Ministry which has exchanged collective
“responsibility for individual responsibility;
“a Cabinet which has a very loose concep-
“tion of the House of Commons, and for
“some purposes is virtually independent of
“it; which stands outside our party divisions;

"which admits to its confidential deliberations representatives of all the great States of the Empire as well as those of the United Kingdom; and which still holds private, but no longer in the strictest sense secret meetings."

"Like most revolutions it is really the result of a long process of evolution. . . . The Inner Cabinet had long existed in more or less unacknowledged form. Mr. Asquith regularised, the Inner Cabinet, and he made a step towards abolishing the secret conclave by providing this committee with a Secretary."

"Parliamentary control had presisted in form, but had been sensibly relaxed. The war which conferred quasi-autocratic authority on the executive diminished it still further; and the formation of the Coalition reduced it to a shadow. This also went far to release the Cabinet from the party system and paved the way for a Government in which that system is ignored."

THE NAVY.

These varied changes in the political constitution were accompanied by equally important changes in the working of the Executive Departments. The Naval administration has perhaps been least affected by these changes. At the outbreak of the war, the British Navy was the largest in the world and was in a high state of preparedness and though there has been a large expansion of Naval strength, no radical reconstruction of the machinery of naval re-organization has been found necessary. Mention must however be made of the constitution of a Naval Staff and the formation of a Board of Inventions and Research "to concentrate expert scientific enquiry on certain definite problems, the solution of which is of importance to the Naval Service."

THE ARMY.

Unlike the Navy, the British army was a small volunteer force of some 900,000 in all branches, of which about 100,000 were available for immediate service. To increase

this to a strength of more than 6 millions was a stupendous task which was only rendered possible by the general adoption of a policy of conscription. At first recruiting was conducted under the direct supervision of the War Office but in October 1915, the recruiting service was reorganized and placed in charge of civilians with the Earl of Derby as Director. Finally, in the latter part of 1917, recruiting was transferred to the Ministry of National Service. Local Recruiting Officers were appointed and Tribunals to deal with claims for exemption were set up throughout the country.

Though relieved of recruiting work and later on of the supply of Munitions, the War Office was found too highly centralised an agency for the purpose of the war. The Secretary of State for War combining in himself both political and military power, occupied a false and impossible position. With the reconstruction of the Imperial General Staff in 1915, the Chief of the Staff was empowered to issue orders in regard to military operations, and this delegation of responsibility left the Secretary of State to be the political but not military head of the Army Department. But even this arrangement was not altogether satisfactory as the relation of the Chief of the Staff to the Commander of the Army in France was not clear. The constitution of a joint allied Staff involved further difficulties. But, for the time being, the defects of organization were not clearly evident as the complete centralisation of the Military command of the allied armies under General Foch ensured unity of direction and eventual success. In October 1916, it was remarked by one writer "There seems to be no appearance of finality in an organization which the highest interests of the State require to be securely fixed on a sound basis for peace and war, and which should proceed uninterruptedly with its all important functions undisturbed by changes and chances of a nature to destroy the continuity and therefore the efficiency of

its work." It does not appear that a stable reorganization was secured even when the war had come to a close.

THE MINISTRY OF MUNITIONS.

The magnitude of the military operations and the development of new devices, materials, methods of warfare vastly increased the problem of supplying the combatant forces with the fighting equipment. After a variety of temporary experiments, *e.g.*, the appointment of committees, had been tried, a new Government Department of the first rank was established under the Minister of Munitions to deal with the supply of arms and munitions. By the end of May 1917, there were 143 Government Factories and 20,000 private controlled establishments with a total of more than 2 million work people. Besides the head quarters staff consisting of 12,190 employees, the Ministry had local offices throughout the country to supervise the manufacture of munitions in National Factories and to arrange for their manufacture in controlled private establishments on a Co-operative scheme. The work of the Ministry included much more than the provision of arms andammunitions. Every machine tool maker was brought under its control. The supply of motor transport, agricultural implements, areoplanes and seaplanes were also transferred to this Department.—In providing house accommodation for munition workers, whole villages were built by the Ministry and large subventions made to local authorities.—Thousands of skilled workers were withdrawn from the army and transferred to where they could be of most service. Skilled labor was diluted with unskilled and the employment of women developed to a remarkable extent, so that in certain branches of munitions work 60 to 80 per cent were women. Much was also done in regard to regulation of wages, hours of labor and conditions of employment. The profits of employers in the munition trades were restricted to one-fifth above the standard amount for the two financial years before the war.

The operations of the Munitions Department involved, in short, a more far reaching Government control of industry than had ever been tried before.

CONTROL OF TRANSPORT, INDUSTRY AND TRADE.

As soon as war was declared, the entire railway system in Great Britain—a total length of some 20,000 miles—was brought under Government control, which was exercised through a committee of Railway Officials representing the several companies. The railways in Ireland passed under Government control in January 1917. More than 2,000 miles of inland canals were similarly taken over and their management vested in a Canal Control Committee.

A Shipping Ministry was constituted to secure efficient organization of shipping facilities. The duty of the Minister, who was known as Shipping Controller, was "to control and regulate any shipping available for the needs of the country in such manner as to make the best use thereof and to take such steps as he thinks best for providing an efficient supply of shipping." Changes were made in the loading rules permitting an increase from 106 to 150 tons for each ton of registered shipping and a vigorous programme of merchant shipbuilding was carried out.

With regard to enemy trading, after various tentative attempts had been made to regulate exports and imports by means of committees, a war trade Department was constituted to deal with applications for export licenses. An Imports Restriction Department was organized in March 1916, under Mr. R. E. Enthoven, a Bombay Civilian.

A Government scheme of insurance against war risks was adopted and a committee to administer the scheme was appointed with two sections dealing respectively with Marine insurance and insurance on account of aircraft and bombardment.

During the year 1917, the patroleum industry was brought fully under Government control.

The supply of coal demanded unremitting attention. It was necessary to see that the labor requirements of the Mines were not affected by Military recruitment and that the cost of the production of coal was not exorbitant. Colliery recruiting Courts were, therefore, constituted and enlistment for the army was restricted to about 30 per cent of the miners. In November 1916, the Government took over the South Wales Coal Mines.

FOOD CONTROL.

The present war witnessed a vast expansion of Government regulation of food supplies, far beyond that of any previous time. Restricting export of food stuffs, and encouraging import by removal of duties were not unknown even in the Elizabethan wars. Most of these measures were repeated during the present war and in addition many other steps were taken including Government purchase and direct control of important articles of food, the passing of numerous sumptuary regulations and the fixing of prices. Many administrative agencies and advisory committees were appointed, and after a considerable period of uncertainty, and sometimes of conflict, between different agencies, a more centralised system of regulation was organized under a new Minister of Food control.

Arrangements were made in 1915 for the purchase of wheat in the Indian market. In 1916, by agreement with the French and Italian Governments, a joint International Committee was organized for the purchase of wheat flour and maize for the three Governments. Large quantities of sugar were purchased by Governments, involving in one year an expenditure of £18,000,000. The appointment of the Food Controller in December 1916, was followed by a series of orders placing restrictions on the milling of wheat flour and at the end of April 1917, the Government took over all the flour mills in the United Kingdom. New orders were issued for fixing maximum prices and restricting the profits of the producers and

dealers. The price of bread was kept down by a subsidy. Great Britain was divided into 16 divisions over each of which a commissioner was appointed and local committees were formed for the purpose of commandeering and re-distributing supplies. Compulsory rationing was introduced for sugar, wheat, and other commodities.

Criticism has been made of the policy of food administration that it tended to place foremost the fixing of prices and restricting of consumption and to subordinate to these considerations the maintenance of supplies. The control of prices appears to have led to reduction of amounts shipped by importers and it has been suggested that an extension of excess profits tax to intercept high profits might have been more successful than the detailed regulation of prices. Time and investigation have yet to show the soundness or otherwise of these views.

Meanwhile the stimulation of home supplies was by no means neglected, although this aspect of the Food question was dealt with not by the Food Ministry but by the Ministry of Agriculture, and between the two there was not co-ordination at all times. Early in the war proposals were made for the increase of corn production by guaranteeing minimum prices for wheat and oats but these proposals were not accepted. Later on, however, in April 1917, a corn production Bill was passed which provided for guaranteed minimum prices for wheat and oats for a period of 5 years, for minimum wages to agricultural laborers and for Government taking over land to secure better cultivation.

THE LIQUOR TRADE.

The exigencies of the war brought to the forefront the question of the regulation of liquor traffic. In June 1915, a central board of control was appointed with wide powers over the sale of liquor and licensed premises and any contravention of the board's orders were declared a summary offence under the Defence of the Realm Regulations. Hours

of sale were reduced from 16-20 to 4½-5½ hours a day, sales being prohibited before midday, during the afternoon and after nine or half past nine in the evenings. In several districts the control Board took over the retail traffic, suppressing private taverns and establishing Government shops under severe and generally successful restrictions. Some interesting statistics are given showing the results of the policy of the Board. The amount of spirits manufactured in 1916-17 was 25 per cent less than in 1913-14. Consumption of beer was reduced from 32,000,000 to 26,000,000 barrels and the maximum output for 1917-18 was further restricted to 14,000,000 barrels. The manufacture of spirits for human consumption was stopped in 1917. Convictions for drunkenness were reduced to one-fourth.

FINANCIAL ADMINISTRATION.

Financial problems arising out of the war, involved (1) a large expansion of the fiscal affairs of Government and (2) far reaching and novel measures for protecting the financial organization of the country against a complete break down. The large sums voted by Parliament have already been referred to. In order to raise these sums, public loans were raised on an unprecedented scale. The total gross indebtedness of Great Britain on February 16, 1918, has been estimated at £5,678,600,000 as compared with £710,500,000 on August 1, 1914, an increase of nearly 700 per cent while the greater part of the war Expenditure was thus met by means of loans, additional taxation was also developed to the largest extent possible. By gradual annual increases, the normal income tax in 1916-17 was raised to 25 per cent, the excess profits tax to 60 per cent (increased again to 80 per cent 8: 1917-17), and customs and excise duties were doubled and quadrupled. The total revenue for 1917-18 amounted to £707,234,000 as compared with £198,243,000 in 1913-14 an increase of over 350 per cent.

In regard to regulation of private transactions, a moratorium was declared on August 2, 1914, postponing payment for certain bills of exchange. When the moratorium was about to terminate an act was passed giving emergency powers to the courts to protect debtors from hardships arising from the war. More direct assistance was provided by the appointment in November 1914, of a committee to grant advances to British traders carrying on export business in foreign countries and the Colonies. On January 19, 1918, fresh issues of capital were made subject to the approval of the Treasury under the following conditions; new issues for undertakings in the United Kingdom to be allowed only when they are shown to be advisable in the national interests; those for undertakings in the British Empire Overseas, to be allowed only where urgent necessity and special circumstances exist and those for undertakings outside the British Empire, not to be allowed at all. The approval of the Treasury was required also to the issue of capital by municipalities and other public bodies for public purposes.

By an act passed in May 1916, the courts were given power to stay execution in proceedings for money due by men and officers in the British forces.

DEFENCE OF THE REALM REGULATIONS.

The Defence of the Realm regulations under which food control liquor control, etc., were operated demand special notice, not only for the intensive system of Policy Regulation which they set up but for the important changes introduced by them in the Judicial procedure. The regulations covered a wide variety of subjects, e.g., restriction of aliens; occupation of land and buildings; control of food supplies; control of motor spirit; control of meetings, recreations, fairs and festivals; control of mines; control of canals; control of licensed premises and intoxicants; control of lights and sounds; control of movements of civil population;

munitions and war materials; banking and exchange transaction, etc. The original act authorised the trial of offenders against the regulation by Courtmartial, or in the case of minor offenders against the regulation by Courtmartial, or in the case of minor offences by courts of summary jurisdiction. Opposition was raised in the House of Lords by Lord Halsbury, Lord Parmoor and Viscount Bryce to thus authorising for the first time in more than two centuries, a civilian to be sentenced to death without trial by jury. Though these objections did not prevail at first, an amending Act was introduced in March 1915, by which British Civilian subjects were given the right to claim a trial by jury except for offences tried by a court of summary jurisdiction. But it was provided that this right might be cancelled by proclamation in case of invasion or other emergency.

OTHER ADMINISTRATIVE AGENCIES.

As regards the numerous other administrative agencies and arrangements developed during the war period, it is not possible to do more than mention a few.

A Ministry was organized in December 1916, for the purpose of organizing and maintaining the supply of aircraft, but it would appear that the Ministry did not possess complete jurisdiction over the air service and its scope of work involved much overlapping with other Departments.

The arrangements made for censorship of the press fluctuated a great deal and no finality or pronounced success was reached even after the development of the press bureau.

Work in connection with Army and Navy pensions reached enormous proportions and after various endeavours to handle it through committees and with the help of voluntary funds, a Ministry of pensions was organized in December 1916.

War charities care of the wounded and care of enemy prisoners required a good deal

of Government organization, which was supplemented, not always with the best results, by numerous volunteer agencies.

The Department of Education, remote as it may appear from the scope of war activities, was also seriously affected by the war. In order to promote recruitment, the enforcement of compulsory attendance at schools was suspended in March 1915. The use of school buildings for military purposes also restricted the course of education. The scheme of national education came under exhaustive examination, and an Act was passed in 1918, providing for compulsory whole time education to children up to the age of 14 years and compulsory part time education to those between 14 and 18.

A labour Ministry was created in December 1916 to deal with labour problems.

What has been called the Government's most ambitious attempt to keep up the essential industries of the country was the constitution of a National Service Department under a Minister of Parliamentary rank. The Department for a time had little work to do until recruitment was added to its operations.

Another novel Department was the Ministry of reconstruction which was organized into 6 branches—finance; shipping; labour and industrial organization; rural development; machinery of Government, health, education, housing; and internal transport. Numerous committees were appointed to deal with various problems but "while a good deal of preliminary work has been done, by these various agencies, there does not appear to have been worked out any comprehensive or consistent policy of reconstruction, nor any agreement as to definite principles on which such a policy should be based.

GENERAL.

The monograph before us, which has been summarised at this length, as far as possible in the author's own words, purports to be a

descriptive rather than a critical account of British war administration. But constructive suggestion is not wanting. The main point made out by the author is that too many independent agencies have been set up to deal with different questions and that there has been a lack of co-ordination. New departments, commissions and committees continued to be established until the total number reached 400. The Ministry itself was composed of 88 officials, 60 of whom sat in the House of Commons and 23 in the House of Lords. As was to be expected from this multiplicity of agencies, there was a lack of clear understanding and the steady pursuit of a definite policy. The Army and Navy lacked a common head and the evils of divided control were emphasised by the constitution of an Air Ministry of Munitions, independent of both Army and Navy.—The jurisdiction of the Food Controller and of the Board of Agriculture came frequently into conflict. The Minister of Labour and the Ministry of National Service had no clear and well defined duties to perform. The Reconstruction Committee practically abandoned its problems and the new Ministry of Reconstruction was generally ridiculed. In regard to financial administration there have been gross instances of laxity.

In spite of these and other similar defeats, British administration during the war period was really a marvel of efficiency. It was the nearest approach known in history to what is termed State Socialism. The agencies of production—land, labor and capital—came under state regulation. The means of transport—railways, canals and shipping—were the subject of Government control. State authority and supervision were extended over the entire trade of the country, both external and internal, wholesale and retail. The operations of Food control involved a minute regulation of consumption over the whole country. The multitudinous task thrown upon Government was discharged with a degree of success

which far surpassed anything that could have been expected. This result, of course, could not have been obtained without the enlightened co-operation of the people as a whole. Hardships and suffering were cheerfully borne, and though there were grumblings and occasional insubordination, the record is one of the acceptance of high ideals and patriotic perception of national needs.

That pet theories and age-old doctrines should disappear in the solvent conditions of the war was of course foregone. The party system which was supposed to be the corner stone of democracy was given up without demur. British horror of conscription died hard but effectually. The theories of free trade and *laissez faire*, which had been undermined even before the war, were now reversed and a process of national regimentation was accepted as a matter of course.

How far these changes in the national institutions and outlook will survive the peculiar conditions which produced them is a highly interesting and important question. But speculation is premature. The monograph before us and other studies in the series purport only to present actual facts as a preliminary basis for more thorough investigation, to be undertaken hereafter, of the effects of the war on economic and social life.

A Forestry Officer has recently been appointed by the Rhodesian Administration and is now conducting a preliminary survey of the timber resources of the territory. Teak and mahogany have already been partially exploited, but it is hoped that a good supply of native soft woods may be located, as the demand for this class of timber, which will provide material for orange and other fruit boxes, is much in excess of the local production.

EMPIRE COTTON GROWING COMMITTEE.*

THE Empire Cotton Growing Committee is now in a position to outline the executive organization it considers necessary to carry out the objects recommended in its main Report published in January, 1920 (Cd. 523). This organization is subject to modification as experience and local conditions require. Most of the funds will be spent abroad in cotton growing countries; and the organization proposed provides primarily for the employment of men abroad with a central office in London to co-ordinate work. As it has not been possible to consult local Overseas Administrations on the details of these proposals, a scheme has been prepared suited, in the first instance, to countries in which cotton growing has not as yet been very largely developed. Many features of the scheme will be of assistance to all the cotton growing parts of the Empire, and, though it is probable that some of the more highly organized of these, such as the Dominions, India and Egypt, will prefer to finance their own arrangements in whole or part, the Committee will be glad to co-operate closely with such countries and, on their invitation, to extend to them any portion of the proposed organization which may prove acceptable.

It will be seen that to carry out adequately the work which the Committee is convinced must be done in order to stimulate cotton cultivation an annual sum of £200,000 is needed.

FINANCE AND SUPERIOR ORGANIZATION.

It is proposed that the funds be provided jointly by trade interests and by the British Government. These funds will be vested in trustees as custodians under Royal Charter.

*With acknowledgements to the *Board of Trade Journal*.

There will be a general Administrative Council representative of trade interests, the Board of Trade, the Governments Overseas, and of the offices of the British Government associated with those countries. The direct control will rest with an Executive Committee appointed from this main Council whilst for particular aspects of the work, e.g., the different countries, research, information, etc., there will be sub-committees to which men of special qualifications and not on the Administrative Council will be co-opted.

EXECUTIVE WORK.

The work which, according to the Report of January, 1920, must be done, if the production of cotton within the Empire is to be considerably increased, falls into three groups.

Group I, Mainly administrative in its character, requiring on the part of the staff general knowledge and organizing ability, includes :—

- (1) Questions affecting general policy, finance and establishment.
- (2) Correspondence with, advice to, information from Government Departments, Local Administrations, Agricultural Departments, and individual planters in cotton-growing areas, and the strengthening and supplementing of local staffs for work on cotton. This last will normally be done by finding men qualified to assist in developing cotton cultivation and by providing their salaries.
- (3) Forming and controlling an organization for keeping in touch with local developments in all countries in the Empire actually growing cotton and in those suitable for cotton growing.
- (4) Organizing and carrying through pioneer work in suitable areas.
- (5) Bringing cotton growers and other workers on cotton growing together by the dissemination of information, and by providing them with facilities for keeping abreast with progress and development throughout the world.
- (6) Giving information, when available, to financial and commercial companies contemplating growing cotton; but on this point the Committee is of opinion that

investors wishing to invest in cotton growing will be well advised to begin by making full enquiries for themselves.

Group II, Demanding scientific knowledge and training on the part of the staff—will include :—

- (1) Keeping abreast of, indexing, having available and disseminating judiciously information on all scientific and experimental work on cotton growing and re-acting on cotton growing.
- (2) Collecting full knowledge of the characteristics of all varieties of cotton.
- (3) Keeping in close touch with the British Cotton Industry Research Association.
- (4) Fostering actual research on cotton growing—
 - (a) By the establishment of a special cotton research station or stations abroad.
 - (b) By assisting in providing facilities for training men for the various agricultural services.
 - (c) By assisting in selecting men for special work on cotton abroad.

Group III, Mainly of a commercial character—will include :—

- (1) Valuing cottons and keeping in touch with all markets.
- (2) Where advisable guaranteeing prices to growers.
- (3) Taking the necessary measures to secure to growers better prices for better cotton.
- (4) Where desired ginning and marketing cotton.
- (5) Spending money on the promotion of the growing of cotton as compared with other crops.

In each of these groups there is much which must be done abroad, but all will require to be co-ordinated, and the three branches must work together supplementing each other.

THE CENTRAL OFFICE.

This will be located in Westminster. It will undertake the general direction and control. This and the work described in the three preceding groups which falls directly on the Central Office will entail :—

- (a) Association with the Government Departments and the Cotton Industry and organizations at home.
- (b) Acquiring and maintaining an intimate and detailed knowledge of the physical con-

ditions and progress of cotton growing, the existence and development of competing crops, the facilities for transport, the labour supply, the conditions and terms on which land is obtainable, etc., in all the tropical portions of the Empire.

- (c) Close liaison with the Overseas Governments and the Departments of the Home Government associated with them.
- (d) The employment of selected men who by touring will keep in touch with local developments.
- (e) The collection and dissemination of all scientific and experimental work done on or bearing on cotton, etc., and the work in Group II. (1, 2 and 3).
- (f) The general direction of the research institutes to be established abroad, and consultation with scientific men on special problems as required.
- (g) Arranging for the efficient carrying out of the Commercial Work detailed in Group III.
- (h) The establishment of a Journal, or co-operation with other bodies for this purpose.
- (i) The engaging of men for strengthening and supplementing agricultural departments overseas.
- (k) Aiding in providing facilities for training men for agricultural departments.

To discharge this work the following staff and organization will be necessary :—

- (1) A General Director who should be selected for his organizing capacity and experience and general knowledge. It would be advantageous if he had experience of tropical administration and conditions and also of cotton.
- (2) A General Secretary.
- (3) Three sections are needed for the work in the Central Office under (b) and (c), viz., acquiring and maintaining detailed knowledge of the cotton growing countries in the Empire. These sections would deal respectively with
 - (i) Egypt, the Soudan, India and the East.
 - (ii) The Rest of Africa excluding the Union of South Africa.
 - (iii) The self-governing Dominions and the West Indies and other parts of the Empire.

Much of the work for the Journal could also probably be handled between these sections.

Each of these three sections will be in charge of an Assistant Secretary the standing of the Administrative staff in the Home Civil Service.

4. The Committee lay special stress on the work under (d)—the employment of selected men as Travelling Commissioners who will keep in touch with local development by systematic touring.

In the development of cotton cultivation, reliance cannot be placed solely or even mainly on a Central Office in London. Any plans for supplementing the staffs of local agricultural departments and for useful expenditure to supplement their efforts, must be first discussed with the local administrations and local agricultural departments, to insure there co-operation and assistance. The various countries should also be visited periodically to promote the maintenance of a full understanding with local administrations. In cases in which exploratory work is organized directly by the Committee, or men happen to be employed abroad directly under the Committee, periodical inspection is necessary. The Central Offices thus need the services of Travelling Commissioners free to tour who should be able to spend sufficient time in the countries they visit to absorb local conditions. Four such men will suffice. At first they will probably be mostly engaged in bringing back suggestions as to how local efforts can be supplemented, whether capital is required for cotton growing in particular localities, and what further exploration is needed. Agricultural knowledge and administrative experience is desirable in these Travelling Commissioners.

5. For the work under (e) and (f) scientific knowledge is required on the staff. A man who had been engaged on scientific work in the tropics, preferably on cotton, and had recently returned to England on pension, should be well suited for much of the work of recording and disseminating information useful for men abroad at work on cotton. The actual Research work to be undertaken abroad will be controlled in each place by a responsible chief, but the financial control will be in the hands of the General Director. The study of special scientific problems will be submitted as required to the highest available authorities by the General Director.

6. It is expected that much of the commercial work under (g) will be done by the British Cotton Growing Association, with whom an agreement has been provisionally arranged, but it will be necessary to have a Commercial Secretary in the Central Office.

On this basis the general scale of salaries for the staff directly attached to the Central Office would be approximately as follows:—

General Director	... £ 2,000 or upwards.
Travelling Commissioner	... £ 1,200 to £ 1,800 plus expenses.
General Secretary	... £ 750 to £ 1,000.
Assistant Secretaries in charge of Territorial Sub-Sections.	£ 400 to £ 800.
Scientific Recorder	... £ 500 to £ 750.
Commercial Assistant	... £ 750.

The cost of the Central Office including rent and minor expenses is estimated to amount to about £ 25,000 per annum.

THE STAFF ABROAD.

Research Station or Stations Abroad.—These will conduct the higher research regarding the cotton plant, as distinct from investigations designed to promote the interests of particular areas, and will be under the financial control of the General Director.

The exact plans are necessarily postponed until the Administrative Council comes into existence and the Director is appointed. It is, however, considered, that a beginning could be made with £ 20,000 per annum to cover salaries and expenses including interest and amortisation on the initial outlay of capital.

SUPPLEMENTING THE STAFFS OF AGRICULTURAL DEPARTMENTS OVERSEAS, AND PIONEERING.

It is convenient to take these two classes of work together as they will only be undertaken after consultation with the Local Agricultural Departments and as the men, who will be engaged for such work, will possess qualifications similar to those required by Agricultural Departments abroad. The duty of providing an Agricultural Department falls primarily on the local government. Whilst the different Agricultural Departments have done much exceedingly valuable work on cotton, yet the care of all crops falls naturally within their duties. If exceptional attention be desired for cotton it is not unreasonable that the Committee should find and pay additional men required for that purpose. In working any such proposals the

greatest stress is laid on the fullest co-operation with the local Agricultural Departments. Help could, of course, be given to them by block grants, but it is believed that more rapid progress may be expected and greater efficiency attained if these additional men are found and paid for by the Empire Cotton Growing Committee. In putting forward this scheme there is no intention of creating an independent body inside a local department. The additional men will be posted to a department for a specified period, after full consultation with and on invitation by the local administration. They will be fully under the control of the local Director of Agriculture, subject to the same rules of discipline as the local officers of the department, and draw their salaries and allowances through the local treasuries, the Committee being responsible to the Local Government for providing the funds needed. As the work of these men will benefit the locality, it is hoped that the Local Governments will supply the subordinate staff necessary and also the local travelling expenses; though in the case of some of the less developed countries it is recognised that contributions may reasonably have to be made for this purpose.

This method is preferable to a system of lump grants to departments, because:—

- (1) It creates a body of men who will have specialised in cotton, from which at times a Local Government may be very glad to draw.
- (2) It is more flexible—local departments are necessarily organized according to the unit of administration, and transfers of men between different administrations are not always easy to obtain.
- (3) It will provide men from which the Travelling Commissioners can later be drawn.

Their emoluments will conform to those paid by the Agricultural Departments of the locality, with proper provision for a system of gratuities based on length of service in lieu of pensions; therefore, in framing these

estimates the scales of pay in force or proposed for many of the Agricultural Departments abroad have been examined. In calculating the numbers required, the countries which are in a comparatively early stage of development have chiefly been considered, though invitations to extend the same system to the countries more fully organized will be welcomed.

Calculating on this basis, it will be necessary to provide for a staff of 90 men (including scientific workers, and agricultural officers of different grades) as supplemental to local Agricultural Departments. This it is estimated will cost £88,000 per annum. Pioneering work, capital expenditure, and local expenses in countries in which local administrations would require assistance will absorb another £15,000.

The provisions for gratuities on termination of service will require the formation of a sinking fund of £7,000 a year.

Travelling allowances for transfers, journeys home and outward—£5,000.

This section of work is, therefore, estimated to cost eventually £115,000 per annum.

EDUCATION.

Other funds which will mainly, but not necessarily, be spent at home will be required for the work under Group II. (iv) *b*—i.e., assisting in providing facilities for training men for the various agricultural services abroad.

It is estimated that to meet the demand for scientists for work on tropical plants, University staffs in this country should be increased specially for this purpose by at least:—

	£
4 Professorships	5,000
15 Lectureships in Science	12,000
6 Administrative and Technical Lectureships	5,000
20 Post Graduate Studentships	5,000
	27,000
Less Contributions from other Industries	
say	16,000
	12,000

Such a staff will be of service to all industries using tropical vegetable products, and it is proposed to endeavour to co-ordinate these industries in a common effort for this purpose. It is suggested that the cotton industry will be doing its share if it finds £12,000 a year.

INFORMATION.

The cost of supplying information and of the issue of a journal has been included in the estimate for the Central Office.

COMMERCIAL HANDLING.

Under this head a great variety of expense is possible, and apart from the difficulty of estimating what money will be wanted, there is the further question as to the amount of assistance that may be expected from the British Cotton Growing Association. It is, of course, understood that in doing commercial work for the Empire Cotton Growing Committee the British Cotton Committee Association will neither make a profit nor incur losses to themselves, and, therefore, profit and loss will fall to the account of the Empire Cotton Growing Committee.

The kind of expenses which will be incurred include the following :—

- (i) Guaranteeing prices.
- (ii) Advances against growing crops.
- (iii) Ginning, baling and costs of bringing to market.
- (iv) Carrying the crop and merchanting.

The following points await further consideration :—

- (a) The probable capital required (other than that which may be obtainable each season from the Banks) for financing every 100,000 bales up to, say, 500,000.
- (b) The losses which must be expected if a liberal policy of forward buying is adopted, remembering the possibility of a fall in the price of cotton during the next few years.

There is another kind of expense not dealt with in the main report, viz., the setting up of experimental cotton growing enterprises

on a semi-commercial scale. The work proposed to be undertaken by the British Cotton Growing Association in India might be mentioned as an instance. It is hoped that before long shape may be given to another organization for growing cotton in suitable places on commercial lines. In the meantime it is considered wiser not to include work of this kind within the scope of this budget.

SUMMARY.

The summary of the foregoing annual financial requirements is :—

	£
Central Office and Journal ...	25,000
Research Stations abroad ...	20,000
Supplementing staffs overseas and pioneering ...	115,003
Education ...	12,000
	<hr/>
	172,000
	<hr/>

To this must be added the Commercial Handling for which no estimate has been framed, but which will require funds.

It is clear that the annual outlay under some of these heads will not at first be realised, but on the other hand it will be necessary at the earliest stages to be very liberal under the head of Commercial Handling in places in which the growing of cotton is still in its infancy. Thus, in order to carry out the recommendations of the main report, an income of approximately £200,000 ought to be assured.

ECONOMICS IN THE WEST.

Some Economic Problems.

London, July 15th, 1920.—Economic problems do not assume a less important character as the war becomes more a memory. There has indeed, in the past few weeks been quite a revival of old fears and doubts owing to a renewal of the active form of industrial discontent. The miners' new demands are of themselves sufficient to excite lively apprehension. Like the daughter of the horse leech of Canning's story they are continually asking for more and the appetite grows on what it feeds on. It has yet to be seen, however, whether they have not this time over-reached themselves. There is a spirit abroad which bodes ill for the success of their demands. A growing feeling exists that the time has come to call halt! to these impudent exactions, and that a strike might be the lesser of two evils. The miners' leaders it is believed would have some difficulty in getting the entire body of miners to come out in support of the present demand which has far more a political than an economic character and which even if successful would not add very much to their already over generous emoluments. And if a strike did occur it could not in the nature of things last very long. Roughly there are at present employed in Great Britain about a million men in the mines, and strike pay would have to be on so vast a scale that the funds at the disposal of the Miners' Federation would soon be exhausted. On the whole I am inclined to think that matters will not be allowed to go to extremes in this direction. But the outlook, apart from the mining trouble is not bright and it is quite likely that before the year is out we shall have another industrial crisis of a serious character. The hope is that the general good sense of the British working classes will avert a prolonged conflict or even one which may have

a general character. At the present time there is exceptionally little unemployment and consequently distress is practically non-existent. What discontent there is is largely the artificially manufactured product of an agitation conducted by extremists for sinister ends. As has happened before in similar circumstances it is probable that the extremists would be routed immediately they put their plans in operation.

THE COTTON TRADE.

In spite of Labour ferment the trade of the country in all the great staple industries continues good and even to show signs of expansion. There are exceptions, of course, due to special causes, such, for example as the cotton trade which has received a bad check owing to the phenomenal fluctuations in the Eastern exchanges! but these do not detract from the general prosperity which manufacturing enterprises are enjoying at the present time. Evidence of the spirit of enterprise which is animating the captains of industry at this juncture is furnished by the action taken by the Ebbw Vale Steel Company in extending its plant. This great corporation which is one of the most important steel producing companies in Great Britain has just installed at its works in Wales at an approximate cost of a million pounds sterling, a new blast furnace which is stated to be the largest in the world. An output of 3,000 tons per week is promised and this may be extended. In any event the production will be enormously greater than has hitherto been secured at any steel works in this country. The experiment of this huge blast furnace—for experiment it is as it is by no means certain that the great size of the undertaking will be financially justified—is being watched with great interest by those concerned in the steel trade, and if it succeeds it will doubtless be a pioneer of a great movement which will embrace all the leading steel producing enterprises of the country. Meanwhile, exhaustive trials are being conducted with new methods of smelting

with a view to the economical production of steel. Mr. J. G. Harvey, the well known expert has recently demonstrated the saving obtained by the use of pulverised coal with special reference to its application in metallurgy. If the results are as good as they are represented to be there will be a great reduction in the cost of steel manufacture to the benefit of the industry. There can be no question that British manufacturers will require all the help they can enlist in the matter of economical working to meet the intense competition which they will have to face as soon as the present abnormal demand for steel has given place to the ordinary steady requirements of the world's markets.

ALCOHOL FOR POWER PURPOSES.

Some impatience is being shown in interested quarters at the indifference and apathy of the Government in regard to the development of the use of alcohol for power purposes. Power alcohol, as it has come to be called, would be a valuable adjunct to petroleum, benzol and other products used in internal combustion engines, and its production on a large scale would seem to be a reasonable measure of precaution in view of the rapidly diminishing supplies of petrol and the ever rising cost of the article. But the authorities have put all sorts of obstacles in the way of its manufacture and they show no present intention of changing their policy. At the present time a considerable quantity of alcohol is used in the manufacture of varnishes, inks, dyes, etc. The product used is pure alcohol denatured—that is rendered undrinkable—by the introduction of some outside element. At present the standard denaturant is wood naphtha, an expensive article whose use would bring the cost of power alcohol to a prohibitive point for motor work. What is needed is a denaturant which while performing all the functions necessary to destroy the potability of the spirit yet preserves its character as a means of power. It is suggested by Major General Sir John Fowler in an interesting article he

has contributed to the Trade Supplement of the *Times* that instead of manufacturing alcohol and denaturing it that the Government should give a free hand in the matter and that enterprise should be directed to the production of a power alcohol which could be denatured at small cost by the addition of some ingredient readily obtainable. He does not consider that it would be possible to manufacture power alcohol from foodstuffs grown in the United Kingdom in consequence of the great cost of such material. But he foresees no difficulty in the way obtaining from overseas abundant supplies of suitable material. He thinks that owing to the great bulk of the raw material it will be more profitable in the long run to manufacture the spirit abroad and impart it and he foresees the day when "pipe lines are run to producing areas in the same way that they are now run to petroleum fields." The question is one which has a profound interest for India. Material for the production of alcohol exists in abundance in almost every part of the country and it is certain that if ever power alcohol attains to the position which Sir John Fowler anticipates for it India will be one of the greatest power alcohol producing countries in the world. The question is one which ought certainly not to be lost sight of in the industrial renaissance of India.

IRON FOUNDRY ENTERPRISE.

The various research committees established under the auspices of the Research Association are getting to work and it is already evident that good results will flow from this interesting new departure. It is surprising how vividly the country has been awakened to its industrial deficiencies by the war. This is true of almost every department of trade, but there are industries which have had exceptionally strong shock in consequence of the experiences they have had of the inadequacy of their methods and the obsolescence of their equipment. The Iron founding industry supplies a case in point.

Though modern iron founding had its home in this country the industry is seriously outclassed by the iron founding enterprise of the United States which is conducted on scientific lines of its own and has attained to a degree of efficiency which our iron founding concerns cannot boast of. An important feature of the advance of the American industry, a writer in the *Birmingham Post* states, is the study of the mixtures of pig iron most suitable for different classes of foundry work. "Specifications built up on these investigations have entirely superseded the unregulated supplies of an earlier day. This matter of drawing up standard specifications in the light of scientific tests may almost be said to be a novel idea as applied to British foundries. Out of the 2,800 foundries in the United Kingdom how many have a laboratory to help them in their work? How many have any exact knowledge of the constituents of the iron they work in or any means of ascertaining it? Very few indeed. The vast majority of the foundries are carried on with eyes which are blind to the light modern science has thrown upon their every day difficulties." It is to the remedying of this state of affairs that the Research Committees will devote their attention. There is the more enthusiasm for the work as it is widely recognized that with up-to-date equipment and efficient organization the existing factories would be capable of an immensely increased output. Innumerable users of castings are crying out for larger supplies to-day. This demand is believed not to be a passing phenomenon due to the abnormal requirements of the war. Foundry capacity, says the writer whom I have already quoted, has not kept pace with the expansion of related branches of manufacture, and they will all suffer as long as this unbalancing continues. It is of the first importance that reform should be gradual and evolutionary so as to dislocate production as little as possible. The transition has, of course, already begun. Many iron founders are having recourse to moulding machines as a means of augmenting output, and if the experience of America is anything to go by machine moulding is destined to become very much more general than it has been hitherto. From all this it is to be gathered that the British iron founders are now very wide awake. The unfortunate thing is that

the men are not equally alive to the needs of the time. They view all new developments with distrust and are so blind to their own interests that they decline to abandon the old deadening methods of production which eschew payment by results and put a premium upon slow and uneconomical work. Enlightenment may come some future day when the strain of foreign competition has revealed unmistakably the essential weakness and inefficiency of the old conditions of working.

THE IMPERIAL EXHIBITION.

The forthcoming Imperial Exhibition in London to which the home government have given a substantial subsidy will afford a unique opportunity to the various outlying portions of the Empire to demonstrate their industrial capacity. So far as the Dominions of Canada, Australia, Newzealand and South Africa are concerned there is no doubt that the opportunity will be availed of to the full. The respective governments of these countries are already taking up the matter in earnest and a full and interesting display of their products is assured. India, it may be trusted, will not fall behind the other portions of the Empire in showing what she can accomplish industrially. In some respects she has more need of the publicity that an exhibition affords than any of the self-governing Dominions. While most people here are well acquainted with the progress of Canada and Australia they are lamentably ignorant of the great strides that India has made in recent years in industrial development. The fault is partly that of the Government which has not availed itself to the right extent of the means of popular propaganda which the self-governing Dominions have long and successfully used. Of late there has been a welcome change in the official attitude, but there is still much to be done before the right measure of popular enlightenment is reached. What is wanted is an India House in a prominent position in the centre of London where there would be permanently displayed specimens of the characteristic manufactures and raw products of India. Such an institution would do more than untold reams of despatches and uncounted tons of blue books to bring home to the British mind the great industrial capacity of India and the unique character of its economic resource.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

Has America Reached Its Cotton-Producing Limit? 12,000,000 Bales Yearly Average.

Washington, D.C., U.S.A., July 26, 1920.—

According to every indication, the United States has reached the actual limit in the production of cotton. This appears to be the conclusion of the United States Department of Agriculture.

Of all world industries, cotton is the most widespread. Of all commercial romances, cotton and its affiliated industries supply the greatest amount of interest. Since 1800 no other branch of business has witnessed such an expansion, and it is difficult to conceive of any commercial enterprise which has a greater or more assured future. But America has reached the peak of its cotton production.

It is estimated that over 6,000,000 persons are directly engaged in the production, manufacture and distribution of cotton, while reliable estimates have placed the amount of capital invested at considerably over \$30,000,000,000. The amount of cotton produced in the world has shown a remarkable increase. While statistics of such a wide-spread industry are necessarily more or less approximate, it is believed that cotton production has grown from 500,000,000 pounds in 1800, to 1,500,000,000 pounds in 1850, 7,500,000,000 pounds in 1900, and 14,000,000,000 pounds in 1913—which is the last year which can be called normal.

The most interesting phase of the figures just quoted is the practically doubled production since 1900, showing that even in these modern times great capacity for the expansion of cotton consumption exists. Since 1914, however, little increase in the world's cotton production has taken place, and one of the greatest problems now confronting the industry, and one which is

receiving a great deal of serious attention, is the increase in the area allotted to cotton cultivation necessary to keep up with increasing consumptive demands.

A study of world cotton statistics and conditions shows clearly that a serious shortage of cotton exists. Although there has been a marked improvement in the present American crop over the early estimates of the Department of Agriculture and other authorities, many unfavourable factors may yet reduce the anticipated yield. Should the present American crop fail to come up to the most recent estimates it will mean the sixth short crop—an unprecedented situation as far as American cotton is concerned.

From the date when the southern American states first began to supply the world with its principal stocks of cotton there has always been a feeling in textile circles throughout the world that when more cotton was needed America would supply it. Up until the present this hypothesis was reasonably accurate. Now, however, a different state of affairs exists.

There is a certain point in every economic situation where the peak, or saturation point so far as ability to produce is concerned is reached. This is very near the case in America to-day. While it is true that considerable areas still exist that might be turned into the cultivation of cotton, it is also true that with the growing tendency of southern states planters to diversify their crops there is a steady encroachment on the amount of land that will hereafter be devoted to cotton. Besides that, the boll weevil pest has been a hard one to contend with, and labor conditions have been anything but satisfactory.

In previous years short crops in this country and resulting high prices stimulated the production in the south to such an extent that an equilibrium was generally reached the following season. Efforts to grow cotton outside of the United States in competition with the southern planters generally failed

because there was so much land in the south still available for cotton that no other country could successfully compete with it. This situation no longer exists, however, and for the first time in the history of the industry the growing of cotton on a large scale in various other parts of the world seems possible of success.

The world is now consuming about 22,000,000 bales of cotton per year, but good authorities believe that the present decade will see an increase in world demand of at least 10,000,000 bales in addition, with a like increase in the decade to follow that.

Where the cotton is to come from to allow the world to double its annual consumption is the big problem. It certainly cannot come from the southern American states. Assuming that the American crop will continue to average 12,000,000 bales, as it has for the past five years and will probably equal this year, it is plain that vast cotton-producing districts in other parts of the world must be developed without any loss of time if a pronounced shortage of cotton is to be avoided.

PRESS ATTACHMENT PRINTS ADDRESSES ON PAPERS.

Printing the subscriber's name and address on the upper right hand corner of each newspaper, as it goes through the press, is the feat successfully performed by an attachment just devised by an inventor of the state of Illinois. The addressing mechanism may be fixed to any standard web printing press or to a flat-bed perfecting press. The address slugs are contained in a series of vertical "galleys," from which they are fed down, ejected singly into a drum, inked, impressed upon the paper, and then passed into a receiving galley below.

By means of a spring-controlled sliding gear in the feed drive, the addressing mechanism is automatically stopped in case of a broken web or other accident in the press, or for any other reason, while the operator is kept informed as to the working order of the

addresser itself by two pilot lights. In case the addresser is stopped for any reason, the press continuing the operator simply inserts a marker in the paper receiver, to indicate the unaddressed copies, which are then used for the customary needs of the office and for street sales, etc.

The whole ingenious mechanism is mounted on the press in such a position that its operator and the pressman cannot interfere with each other, but remain entirely independent. This feature, as well as the device itself, is fully protected by the patents.

MINING COPPER FROM "FIRE STOPES."

Peeling the side of a mountain off a great copper ore deposit as one would strip the skin off a banana; and blowing streams of cold air on masses of incandescent rock to cool them, are two of the remarkable mining methods of a great copper company in the state of Arizona; but because the cold air does not always cool all the glowing copper rock sufficiently to enable the miners to work the company will now resort to steam shoveling in order to clean out its "fire stopes."

At this time, some months after the beginning of actual operations on the surface, the company has removed a large part of the old slag dump which filled the gulch below the original shaft head and covered the site of the contemplated operations, which experts consider the most efficient for handling ores. The next step will be to remove the mine buildings from their present location in the gulch, start the steam shovels eating their way into the side of the hill, and, in time, to send loaded ore cars direct from the surface to the smelting plant, which is about seven miles away.

In common with copper mines everywhere, this particular mine has endured a plague of fires in its timbered stopes. And no wonder, for much of the ore carries 30 to 42 per cent of sulphur, and even the lighter sulphur-laden ores contain from 3 to 25 per cent of this inflammable element.

The first fires recorded in the mine occurred in 1894 and were caused by a cave-in of the ore body. Since then there have been numerous fires in timbered workings, for which several causes have been attributed. It is even stated that true spontaneous combustion was responsible for some of them.

The adoption, since 1908, of the mill-hole method of mining has done away with some of the fire danger, and even in that day the company had decided to reserve large bodies of ore for steam shover work.

Since the miners at this location began fighting the flames they have used virtually all known methods in vain. Flooding with water of no avail, for the water escaped through the broken ground; carbon dioxide gas, blown into the hot areas, failed because there was always enough air in the fissures to nullify the smothering effect of the heavy gas; pipe lines were laid and jets of steam were forced into the ground, but the inability of the miners to seal up the fire areas made this method useless.

Several years ago the company adopted the so-called plenum system—remarkable from the point of view of the layman, in that it sought to stop burning by blowing air on the burning materials. Stopes were opened up where the rock glowed in the dark its internal heat. Gas from the oxidized sulphur drove the miners out in disorder, and no helmets availed to protect them.

These hot stopes were gradually cooled by means of gentle currents of air, blown into them under an intricate system of ventilation control. Temperatures of 1,200 degrees F. were reduced to 120 degrees in about five weeks, and further lowered to 100 degrees in the course of time. The cooler air currents also protected the miners and enabled them to breathe while they were recovering the calcined ore.

All strictly underground work in the fire stopes will be discontinued in the zone where the steam shovels will rip out the heart of the mountain.

There are other steam shovel projects in operation throughout that section of the country. At some points low mountains of copper ore are being moved bodily into the mills. At one place, standard gauge railroad lines zig-zag up a mountain side and carry the shovels into a great semi-circular cut.

At the mines now in question three shovels already are operating. One of these bites out eight cubic yards of material at a swing, and loads a car with three scoopfuls. This monster, much resembling a misplaced Mississippi River steamboat, has been reducing the slag dump of many years on which many of the old mine buildings were standing. The material is carried down the gulch to what is known as the 500-foot level, where it is being used to construct a flat for a new townsite. Incidentally, the company is going to devote part of this made ground to a baseball field for the miners. The "shelf" will overlook 40 miles of the near-by valley and a wonderful panorama of distant mountain peaks.

About 14,000,000 tons of waste will be removed by the shovels in the course of uncovering the ore, and it is expected that approximately 5,000,000 tons of copper ore will be exposed in the excavation. The pursuit of the hot ore will carry the diggers downward on spiral tracks until it becomes no longer the most profitable way to mine.

TRUCK WITH THREE-POINT SPRING SUSPENSION.

An interesting adaptation of the principal of three-point spring suspension to a recently-constructed six-ton motor truck has resulted in making the vehicle peculiarly flexible as to road obstructions. The single front spring is arranged transversely, above the front axle, and the truck frame is pivotally supported at its center. This allows either front wheel to be thrown considerably above or below the road level without affecting the stability of the load. The rear springs are of the regular longitudinal semi-elliptical form, but with sliding contracts with the frame instead of

the usual shackle arrangement. The lubricating system used does away with the common array of grease cups about the chassis, and the rear bearings of the tubular truss rods are lubricated by heavy oil carried by the rods themselves. The 28 horsepower engine will handle a 75 per cent overload, and is most efficient at a truck spread of 14 miles an hour.

TAKING LONG-DISTANCE PHOTOS WITH FIELD GLASSES.

For most photographers who have progressed beyond the "you push the button and we do the rest" stage the tele-photo lens has always held a great fascination, and the possessor of one of these pieces of apparatus is usually looked up to with considerable respect by his less fortunate brethren. It is not essential, however, to own one of these high-priced lenses in order to secure excellent pictures of distant scenery or objects. With a pair of field glasses and the ordinary film kodak remarkable long-distance photographs may be obtained. Of course, a focussing plate camera is more convenient, but it is not vital to producing satisfactory results.

If a film kodak only is available the regular kodak lens should first be removed and the field glasses mounted in front.

A thin board, with a hole drilled to allow the tripod screw to pass through, is first set on the tripod and the kodak or camera is then firmly screwed in place. A small box notched to receive the glasses is set on a board in front of the kodak so that one of the eye-pieces will exactly coincide with the opening in the kodak lens board. A piece of black velvet cut to fit between the lens board and eye-piece will make this joint light-proof. In order to secure a sharp picture the back of the camera should be removed and a piece of ground glass substituted. By means of the adjusting screw on the field glasses a remarkably sharp image can be obtained. Exposure will be largely a matter of experi-

ment at first, but a few trials will readily determine the correct time to be given. It is almost impossible to approximate a correct exposure off-hand, as it will entirely depend on the type of field glasses used, but it is said that a good starting point is twenty times the exposure that would be given with the regular lens open to its widest stop.

Although not so portable and convenient as a tele-photo lens, it will be surprising what satisfactory results can be obtained with this combination of field glass and camera. Even the smaller "opera glasses" can be used to good advantage, and some amateur photographers are using with considerable success a surveyor's transit or telescope mounted before a camera in this way, and which is said to produce truly remarkable results.

At first thought it might seem that by enlarging a small negative taken with the ordinary lens everything accomplished by the telephoto lens might be reached in a more simple way; but a single trial will show that after a few diameters the enlargement will possess very "fuzzy" details. A tele-photograph gives details that are not visible in the smaller negative and cannot be brought out by enlargement. With the simple apparatus described, a very fascinating field is open to the amateur as well as the professional. One important point to be kept in mind is that it is quite necessary to have the extension box firmly fixed to the camera bed or on the tripod top as well as the camera to the tripod. An unnoticeable move on the average camera that would do no harm will spoil the exposure taken through a field glass lens.

ALFRED T. MARKS.

NOTES.

The Admiralty desire to call attention to the importance of the Thermionic Valve making industry in Great Britain. The development of thermionic valves for wireless telegraphy increased enormously during the War, and it is believed that the quality of articles produced in Great Britain is now superior to that of any other country. It is contended on behalf of the British industry that:—

- (a) The United Kingdom produces a larger variety of standardised valves than other countries, and is consequently better capable of supplying types to meet any possible requirement.
- (b) High power valves for W-T transmission, radio telephony or any other purpose requiring heavy oscillatory currents have been developed and standardised to an extent which is believed to be far in advance of that of any other country.
- (c) The British technical publications on valve subjects show that a higher standard of technical knowledge has been obtained in the United Kingdom than abroad.
- (d) There is some doubt as to the actual number of valves being produced by different countries, but it is probable that, although during the war Great Britain produced less quantities than, say, America, the facilities for production, organization, machinery, etc., have been better preserved in this country than abroad during the reaction experienced in the post-war period.

A list of British manufacturers of these valves may be obtained from the Depart-

ment of Overseas Trade, 35, Old Queen Street, London, S.W.I.

Madras Publicity Bureau in a note says:—There is and has been a considerable stringency in the money market. The floatation of a large number of industrial companies and the requirements of trade, increased by the rise of prices have absorbed a large amount of money, largely in the shape of share capital. These demands, offering attractive rates of interest or high expectations of profit, have diverted the funds which would otherwise be available for the co-operative movement, which in consequence is hampered by the scarcity of money. In this general dearth of available capital the Madras Bank and Nidhis and private companies and individuals have raised the rates of interest paid to depositors and charged to borrowers. In this circumstance, in order that a larger volume of money may come into the co-operative banks it is proposed that more attractive rates of interest shall be offered by them to the depositors. The Madras Central Urban Bank has accordingly suggested that its rate of interest on deposits shall be raised to $6\frac{1}{2}$ per cent and its rate on loans to Central Banks to $7\frac{1}{2}$ per cent and that the corresponding rate of interest on loans by central banks to primary societies shall be $8\frac{1}{2}$ per cent, and that on loans by primary societies to members Rs. 10-15-0 per cent. This proposed increase in the rate of interest on loans by the provincial banks to central banks, by central banks to primary societies and by primary societies to members will not apply to past transaction; and it is to be anticipated that the increased rates will be reduced when greater ease in the money market admits of getting money at cheaper rates. The Government have agreed to the above suggestion and have advised the Registrar of Co-operative Societies to register the necessary amendments to the bye-laws accordingly.

H. M. Consul at Helsingfors says:—In the course of a tour of inspection of the Finnish timber and paper-making industries, made in company with the representatives of United Kingdom newspapers, a visit to the town of Enso was paid. Here a new mill is expected to start work in September next. It will commence with a production of 40,000 tons per annum, but plans have already been drawn up for considerable extension, which will increase the entire output of the establishment to 90,000 tons. Some of the machinery has been supplied by a British firm. It should be stated that most of the machinery installed in the country's mills is of German, Swedish, or United States origin, very little having come from the United Kingdom. This was not, however, the case with boilers, which were mostly of British make. According to the latest available statistics there are in all 26 paper mills in England, with 71 paper-making machines and 7 cardboard mills with 12 machines. The water-power utilized for working these mills is 73,390 horse-power and steam 13,820 horse-power. The number of hands employed exclusively at the paper mills is 6,096, and the yearly output is 230,000 tons. The capital involved is 261,998,000 Finnish marks. There are also 18 sulphite mills producing annually 190,200 tons, capital involved 194,244,000 F.Mks. and 6 sulphate mills producing 66,000. The capital involved is 104,000,000 F. Mks. The sawmills number 375, employing 14,111 hands with an annual production in value of 98,962,900 Finnish marks.

The Madras Publicity Bureau in a note says:—The Government have carefully considered the question as to how far export of Ongole cattle to Java and other foreign countries has been detrimental to the breed and whether any steps should be taken to prohibit such export and are of opinion that the deterioration is not due to export alone and that other means should be adopted to im-

prove the breed. The Board of Agriculture which met at Pusa in December 1919 recommended that, with a view to increasing the supply of animals to meet increased demands consequent on the change in economic conditions, Local Governments should encourage and foster the cattle breeding industry by the establishment of farms in breeding tracts, by the distribution of breeding stock and by propaganda. It was further suggested that endeavours should be made to fix a standard of quality for the different breeds on a quantitative basis with a view to gauging the extent of any deterioration or improvement that might take place. The Government have already sanctioned the opening of a cattle farm at Chintaladevi in the Ongole tract and proposals to open in the Kangayam tract have also been approved and bulls from these farms will be put out for stud purposes or sold every year. The Director of Agriculture will consider what other steps are possible to secure the breeding of the best types of cattle in the Presidency and report to the Government from time to time on the measures he proposes.

The Government of India calls attention to the danger of anthrax communicated by infected shaving brushes in the following lines:—"During the past year, several cases of anthrax due to infection contained in shaving brushes were reported. The majority of such brushes are suspected to have been made in Japan and unless arrangements can be made to exclude infected shaving brushes from the market it is desirable to warn the public against the danger of contracting the disease from such brushes. The danger is not necessarily confined to shaving brushes, but is liable to exist in tooth brushes, nail brushes and cheap paint brushes also. The Government of India are advised that, if intending purchasers obtain an assurance that the brush offered for sale is not one of a batch imported from Japan and disinfect all doubtful brushes, especially the

cheap variety, the danger would be lessened. The following method of disinfection has been suggested:—Thoroughly wash the hair of the brush with soap and warm water to which a little washing soda has been added, rinse in warm water and then immerse overnight in a disinfecting solution consisting of either perchloride of mercury 1 in 1,000, or formalin 2 table spoonfuls to half a pint of water. After removal from the disinfecting solution, the brush should be washed and then allowed to dry before use. The disinfecting solution should initially be at a temperature slightly above the body heat and care should be taken not to allow the hairs of the brush to come in contact with the hand while under disinfection."

The Acting Commercial Secretary to H. M. Legation at Berne writes to the *Board of Trade Journal*:—One of the chief industries in Switzerland is the manufacture of silk goods, of which the centre is Zurich. This silk industry dates back to the thirteenth and fourteenth centuries. During the last 50 years the district of Zurich has concentrated its energies on silk textiles, whereas Basle has made a speciality of silk ribbons and floss silk. The following table gives the extent of the export value of the Zurich textile industry and the Basle silk ribbon and floss silk industries for the years 1907 and 1913-19:—

Export value in millions of francs.			
	Zurich. fabrics.	Basle. ribbons.	Basle. silk.
1907 ...	117.0	45.7	27.2
1913 ...	112.5	42.0	28.3
1915 ...	128.4	60.0	29.0
1916 ...	167.7	73.1	61.0
1917 ...	144.0	54.8	52.7
1918 ...	110.5	52.9	38.7
1919 ...	427.0	104.0	55.0

To the above figures may be added ten million francs' worth of silk taminy from Thal (St. Gall). Switzerland also possesses a large factory for artificial silk in Emmenbrücke, near Lucerne. Basle is the chief

centre for silk ribbon weaving and competes successfully with France, Germany, and the United States of America. In 1916 the value of silk ribbon exports reached a total of 73 million francs, and in 1919 the value of such exports exceed 100,000,000 francs.

Mr. Kelway Bamber, Secretary of the Ceylon Agricultural Society, realising that an immediate increase in the yield of paddy-fields is possible by the application of manure, is conducting in the Kandy district an interesting series of experiments and the Senior Agricultural Inspector, Mr. Molegode, has been placed on special duty for the purpose. Three mixtures of fertilisers are being tried and already about thirteen fields have been manured. The mixtures are composed of: (1) fish guano, Ephosphosphates and Nitrolium in the proportion of 35, 40 and 9 lbs.; (2) bone dust and Nitrolium in the proportion of 60½ and 12½ lbs.; (3) Ephosphosphate and Nitrate of Potash in the proportion of 50 and 20½ lbs. These experiments will yield definite results, and the crop which has been manured being a short one, results was to have been available by August, and it was expected that the effect of the manure would continue up to the end of the next crop. The great advantage in these mixtures is that they are cheap, costing only about Rs.15 per acre—an increased yield of 5 bushels pay the cost of the manure, a manure, but a minimum increased yield of 15 to 20 bushels per acre may be expected.

A Press communique of the Government of India (Department of Commerce) dated Simla, 20th August, says:—The Government of India have decided to appoint a small Committee to consider and report on the extent to which the existing excise regulations in the various provinces of India require amendment in view of the possibility of the manufacture of industrial alcohol on

a large scale being taken up in the near future. The Committee will be constituted as follows:—President. The Honourable Sir John Maynard, K. C. I. E., C. S. I., I. C. S., Financial Commissioner, Punjab. 1. Dr. N. L. Sheldon, Ph.D., F.I.C., Chief Inspector of Explosives with the Government of India. 2. Mr. R. L. Jenks, F.I.C., F.C.S., Chemical Examiner for Customs and Excise, Calcutta. 3. Mr. W. Neilson, Manager, The East India Distilleries and Sugar Factories, Limited, Nellikuppam, Madras Presidency. Secretary, Mr. J. B. Taylor, I.C.S. It is proposed that the Committee shall assemble at Simla on the 28th August 1920. All communications intended for the Committee should be addressed to the Secretary, Mr. J. B. Taylor, I.C.S., care of the Department of Commerce, Simla.

The tenth meeting of the Education Section of the Board of Industries, United Provinces, was held in Cawnpore on 29th July, 1920. Amongst the matters disposed off were the following:—A number of applications for grants-in-aid were considered and recommended. The Board approves of a set of rules framed regarding the advance to be granted to successful ex-students of the Technical and Weaving Schools for the purchase of machinery and appliances required by the trade in which they have been trained. Rules for the Boarding House attached to the Central Weaving Institute, Benares, were considered and the Board suggested their adoption for all hostels. Constitution of the Advisory Committee of the Government Carpentry School, Allahabad, was considered. The proposal regarding the construction of quarters for teachers and clerical staff at the Technical School at Lucknow, and that of coolie lines was considered and recommended. The abolition of the Junior classes at the Technical schools, Lucknow and Gorakhpur, was considered and recommended.

A novel objection to legislative effort which aims at limiting night work for women appears in the current issue of "Time and Tide," the new and admirable weekly review. The British Government has introduced a Bill which regulates the work of women, young persons and children according to the principles adopted by the Washington Convention, the "Time and Tide" seems to be opposed altogether to the distinction made between men and women. It takes the subject of night work as an example, and declares there is no better case for forbidding it to women than there is for forbidding it to men. Its argument is that all night work is unpleasant, that it should be eliminated as far as possible for both sexes, but that the present proposed distinction between men and women creates an economic injustice for women by forming one more artificial barrier between the work of men and women. This is a fair point for argument, but it reduces conditions of labour to the rather callous basis of economics in a somewhat extravagant championship of women's rights.

At the recent Brussels Health Congress in a discussion on the right of married women to work in factories—a subject far wider than the one we are now considering—the British delegates as well as French doctors at the Branch Academy of Medicine gave their general view that there are no ill effects to the health of either mother or infant as a result of factory work, but a resolution was passed agreeing to discourage in every possible way except by legal measures the employment of married women. It was not surprising that the British delegates were unable to go to that length, and that they refrained from voting. At the same time, a French physician, describing the views of the French Academy, said that the doctors had agreed that with certain safeguards, such as forbidding dangerous or night work, factory work would not endanger the young generation. It is to be hoped these French doctors will not be considered too old-fashioned in sticking out against night work for women.

GLEANINGS.

Louis Piche, Provincial Forester, estimates that in Quebec there are 360 million cords of all pulp woods. Of this amount there are 155 million cords of available spruce and balsam, which at the present rate of cutting—namely, 3,000,000 cords per year, would give about 52 years' supply. It is estimated that there is in Ontario 250 million cords of spruce and balsam. Of this, it is estimated that at an early date the cut will be $1\frac{1}{2}$ million cords, which indicates 67 years' supply. New Brunswick, with 36 million cords of spruce and balsam, and an annual cut of $1\frac{1}{4}$ million cords, has sufficient for a 29 years supply.

It is reported that Dr. Steinbach of Vienna University, has succeeded in restoring mental and physical strength to aged human beings and animals. He states that the revival of the germ glands is made possible by a simple operation and a similar result can be obtained by the repeated application of the Rontgen Rays and Rays and X-rays. The effect of all the operations performed on old men and animals is marvellous. Their appearance is in every respect rejuvenated, their mental and physical capabilities are restored and a new lease of life and vital energy is secured.

The Canadian Government proposes to assist the shipbuilding industry in Canada by guaranteeing notes up to 50 per cent, of the cost issued by foreign interests for ordinary vessels of 3,000 tons and upwards, repayment to be made within five years. It is believed that this will result in the placing in Canada of from \$25,000,000 to \$30,000,000 worth of foreign orders for ships.

A series of cinematograph films showing the development of the industries of South Africa is in course of preparation. The films, which will be exhibited all over the world, will depict the gold mining, diamond digging, steel, pottery, sugar, dairying, fruit growing, dried fruits, leather, wine and coal industries, in addition to port and harbour activities and coal banking.

The New Zealand wheat crop, 1919-20, is expected to yield 4,100,000 bushels, compared with 6,700,000 bushels in 1918-19. The oat crop is estimated at 5,575,000 bushels compared with 6,885,000 bushels in 1918-19. The yield per acre for wheat is estimated at 29-10 bushels and for oats at 30-85 bushels, compared with 31'57 and 39'87 bushels respectively for 1918-19.

A new Canadian industry has been established at Deseronto, Ontario, by the Quinte Chemical Company, Limited, who have undertaken the manufacture of juniper oil and cedar oil. Juniper oil is produced from the berry of the juniper bush, a shrub widely distributed throughout Canada from the Great Lakes to the Rockies and beyond them.

A noteworthy feature of the Canadian export figures for the 12 months ended May 31, is that whereas the United States bought commodities to the value of \$22,000,000 more than during the preceding 12 months, the United Kingdom bought approximately \$101,729,000 less. The value of exports to France also fell off to the extent of \$29,000,000.

The Government of Jamaica is advertising in Cuba and elsewhere for a sugar expert to take up the position of manager of the sugar factory to be established in the eastern section of the colony by the Government. The salary offered is £2,000 per annum. The Government is about to appoint a Sugar Board to supervise the running of the factory.

The quantity of sugar in stock at Cuban ports was only 672,948 tons of April 30 last, compared with 1,097,753 and 1,042,422 tons in 1919 and 1918, respectively. Another million tons are probably stored inland, but the fact remains that, at least half of this season's crop was shipped abroad during the first four months of 1920.

Plantations in the colony of Barbados are changing hands at record prices. A year ago estates were sold at an average of £100 per acre. Recently one plantation of 658 acres was sold for £120,000, or more than £180 per acre. This is the result of the

scientific methods of cultivation adopted in the colony.

Rhodesian farmers have been selling their new season's maize at prices ranging from 22s. 6d. to 27s. per bag of 200 lb. The Co-operative Farmers Society, which handles the bulk of the crop, is stated to be guaranteeing its members a minimum of £1 per bag. The crop is expected to be a record for the territory.

The British Indian Steam Navigation Company has ordered three large motor ships designed to carry 150 passengers in addition to 10,000 tons of cargo. Complete plans and details of these vessels, the first motor liners for passenger traffic, are published in the current issue of the *Motor Ship*.

The Jamaican Legislature has, by resolution, decided that the preference of 40 per cent on cotton piecegoods imported into the island from the United Kingdom, and 50 per cent on such goods made entirely of cotton grown within the Empire, shall apply to other portions of the Empire.

Out of the total area of 157,000,000 acres in British East Africa, about 2,500,000 acres are forest reserves. The forest industry there is developing into a very important one, and the Government is now tackling the question of harbour improvements to cope with timber exports.

The *National Belge* states that a big English company, possessing travel bureau in India, Egypt and America, has bought from the Maritime Society of Bruges Zeebrugge the right to develop the Mole and harbour of Zeebrugge for use in connection with the business of the company.

The Department of Agriculture in the Philippines is utilizing the cinema to demonstrate approved methods of cultivation, preparation of seed, use of farm machinery, harvesting and storing crops, and packing and handling where these processes are involved.

Special buildings are to be constructed, at a cost of £40,000, at Bienfait, Saskatche-

wan, for the purpose of producing a briquette from low-grade lignite with which will produce as much heat as Pennsylvania anthracite, and will cost less than domestic coal.

Several paper mills in the Lothians are receiving enormous quantities esparto grass from North Africa and Spain, many shiploads having reached this country recently. It is anticipated that this will ease the prevailing paper shortage in Scotland.

The Philippine Government has planned to spend 50,000,000 pesos on irrigation proposals for the purpose of increasing rice production to twice its present output, making the islands self-supporting and providing a surplus quantity for export.

The Norwegian Parliament has passed a bill putting houses on allowance, so that in all flats of ten rooms or more the number of rooms over and above the number of inmates in the house will be let out to people suffering from the present house shortage.

The Kerensky and Romanoff paper money in circulation amounts approximately to 150,000,000 roubles. This total represents but a portion of the flood of paper currency issued in Russia during the last few years.

The census estimate of the value of the output of Canadian factories for 1870 was \$221,000,000. For 1917, the last year for which figures are available, it was \$3,000,000,000, an increase of about 1,400 per cent.

Much real property of all kinds has recently been purchased in France with foreign capital, especially in the country districts and in the old battle area, where numerous Americans, Swiss, British and Spaniards are now farming.

The Ford Motor Company contemplates establishing an assembling and distributing plant for the Maritime Provinces in the city of St. John, New Brunswick, and officials of the company are arranging for a suitable building site.

The Georgetown, British Guiana, Chamber of Commerce at a recent meeting decided to communicate with the British Cotton Grower's Association on the possibilities of the cotton industry in British Guiana.

Only 2 per cent of the population of 400,000,000 in China are able to read. Motion picture shows are now being used for educational purposes. Their popularity is increasing by leaps and bounds.

The average annual export of cotton from China exceeds the imports by about 600,000 piculs (one picul equals $133\frac{1}{2}$ lb.) or about 4 per cent of the country's production which totals 15,000,000 piculs.

A scheme for connecting Nippon, the main island of the Japanese group, with the island of Kyushu by means of a tunnel starting at Shimonoseki has been taken up by the Japanese Government.

Started for the first time in 1916, rural credit associations in the Philippines numbered 418 at the end of 1919, with a membership of 73,381 and a financial turn over of 1,594,597 pesos.

Sugar exports from Cuba amounted to 1,897,207 tons during the first four months of 1920, compared with 1,392,952 and 1,133,222 tons in 1919 and in 1918, same period.

It is announced that the Government of the Union of South Africa intends at an early date to proceed with the electrification of the railway line from Cape Town to Simons-town.

France continues to suffer acutely from a shortage of food-stuffs, raw materials, machinery for local industries, and many essential articles of manufacture.

Owing to the uncertainty of the coal supply from the United States, the fuel restriction which were in force in Canada during the war have been reimposed.

Owing to the uncertainty of the coal supply from the United States, the fuel restrictions which were in force in Canada during the war have been reimposed.

Lafayette wireless station, near Bordeaux, develops a power double that ever before attempted, and the length of its wave is about half-way round the world.

A representative of J. and P. Coal Limited, is investigating the possibility of cotton growing in Brazil, particularly Maranhao and Pernambuco.

A consignment of 100 tons of sunflower seed, grown in Southern Rhodesia, has been shipped to England for conversion into oil and cake.

During July last 500,004 rupees were coined at Bombay Mint. The total number of rupees coined from April to July was 33,200,065.

All the Canadian railways have applied to the Railway Commission for authority to raise their freight rates by 30 per cent.

Cotton-growing is being attempted in the Midlands of Natal, and the prospects of the industry are said to be encouraging.

Diamonds to the extent of 873,961 carats, valued at £2,661,854, were produced in the Transvaal during the year 1919.

Tasmanian Civil servants' salaries have been increased by 10 per cent to meet the increased cost of living.

Porcelain money to replace small paper money is expected shortly to appear in circulation in Germany.

Fifteen hundred guineas was obtained at the Sydney annual sheep sales for special stud merino ram.

Measures for the punishment of food speculators have been approved by the Spanish Cabinet.

ECONOMIC NOTES.

INDUSTRIES AND COMMERCE.

Economic Conditions in Germany.

A Report of the Industrial and Commercial Conditions in Germany at the close of last year has been issued as a White Paper (Cmd. 752. Price 4d.) We may consider here the general financial and economic diseases from which a defeated Germany is suffering, and from which for a considerable time that country must continue to suffer. The loss of the war, following upon methods of finance which did not contemplate defeat, but which looked rather to the receipt of indemnities from beaten enemies, destroyed German credit abroad. Raw materials for industry had been used up, and Germany had both lost coal fields and become liable to supply coal to France. In the absence of raw materials and fuel it was not possible to manufacture goods in sufficient quantities to re-establish an export trade balance. Currency was largely inflated, and continued to suffer from further inflation in order to meet expenditure for which taxation supplied no adequate revenue. Superimposed upon these economic consequences of defeat were the financial obligations, undetermined in amount, which Germany had accepted under the Peace Treaty.

CURRENCY INFLATION.

During the summer of last year there was a decline in the paper currency both of State Bank notes and of Loan Bureau notes, but a rapid reaction was witnessed in the autumn, while by the end of December the notes issued showed an increase of over nine thousand million marks in four months. The Report states that the reasons assigned for this enormous increase in paper currency in the second half of the year was, in the first place, the upward movement in prices generally and the consequent greater demand for money; the prices of iron and metal, and the repeated rises in the price of coal, of food, of railway tickets and electricity. Further, the order forcing banks to reveal the holdings of their clients in stocks and shares led to large realisations and the hoarding

of the money thus realised. Another cause is to be sought in the law concerning the Levy on Capital (Reichsnotopfer). People naturally felt that cash transaction and ready money kept in their own houses were safer from the investigations of the tax-gatherer than any form of investment. The uncontrolled imports into Occupied Territory and the payments for the Armies of occupation were quoted as contributory causes for the inflation of German currency. At the end of 1919 the State and Loan Bureau notes issued amounted to 49 thousand million marks, as compared with 2,406 millions in June, 1914. The note currency had therefore been multiplied by twenty since the middle of 1914.

THE INTERNAL DEBT.

At the end of March, 1915, the German Public Debt amounted to less than 17 thousand million marks. Five years later, at the end of March this year, it was estimated by the Ministry of Finance at 219 thousand millions, an increase of rather more than 200 thousand millions. This debt does not include the liabilities under the note circulation, which have been placed, as above stated, at 49 thousand millions at the end of 1919. Neither does it include any estimate of Germany's liabilities under the Peace Treaty obligations. The Report states that the only positive measures which were taken during 1919 to bring German internal finances into order and to consolidate the floating debt of over 100 milliard marks, which exists in addition to the 90 milliards of War Loan, was the enormous volume of new taxation. The consolidation of the 6 milliards of marks in Belgium and the Premium Loan, which had the same object in view, hardly affected the situation, the first because the amount involved was too small and the second because it was a failure.

NEW TAXATION.

During 1919 the following new taxes and levies were introduced:—

Direct Taxation—

1. Extraordinary War Levy for 1919.
2. War Increment Property Levy for 1919.
3. Great Levy on Capital (spread over 30 years)
4. Death and Legacy Duties.
5. Centralised Income Tax.
6. Special Tax on Revenue from Capital.

Indirect Taxation—

1. Tax on railway tickets and way-bills.
2. Tax on Land Transfer.
3. Rayon Tax (i.e., on land the value of which increases owing to the compulsory razing of fortresses.
4. Stamp Taxes.
5. Tax on Business Turnover.
6. Tobacco Tax.

7. Coal Tax.
8. Spirit Tax.
9. Beer Tax.
10. Wine Tax.
11. Sparking Wine Tax.
12. Vinegar Tax.
13. Mineral Water Tax.
14. Coffee and Tea Tax.
15. Sugar Tax.
16. Taxes on Matches and Lighting Material.
17. Playing Card Tax.
18. Amusements Tax.

The system of taxation imposed for national purposes is being reformed in order to concentrate the levy and control of taxes in the hands of the Central Government. The subordinate Governments and Municipalities were left to invent new taxes in order to make up for the loss of local revenue.

A point to be remembered is that this new taxation, added to that which was imposed during the war, will not be more than sufficient—even if it produces the revenue expected—to meet Germany's internal financial requirements. Her chief difficulties, the restoration of her credit and the rebuilding of an export trade balance, remain unaffected. The immediate obligations arising out of the Peace Treaty were estimated for, but no provision was made in the Budget of 1919-20 for those liabilities which have not yet been explicitly determined by the Allies.

COAL AND TRANSPORT.

Although the production of coal improved in Germany during 1919, it was not possible to accumulate stocks, and transport difficulties caused both the domestic and industrial supplies to be precarious. A few examples are given in the Report, which show to how great an extent industrial recovery is hampered by shortage of fuel. The examples given are those of industries which obtain their raw materials for manufacture within Germany itself.

- (a) The Cement Industry consumed 300,000 tons of coal per month before the war; at the time of the greatest demand during the war it received 140,000 to 150,000 tons, and at present it is receiving 60,000 to 70,000 tons. Its production is about 100,000 tons of cement per month now as against requirements amounting to 1,100,000 tons.
- (b) The Lime (Kalk) Industry consumed 250,000 tons per month before the war, while now it cannot be allotted more than 70,000 tons, including lignite, in spite of preferential treatment. As the production of this industry must in the first instance be used for the supply of nitrogen works,

for smelting works, and for the chemical industry, the shortage of lime in the building trade and for manure is apparent.

- (c) Before the war there were 18,000 brick kilns in Germany; by the autumn of 1919 only 1,200 to 1,300 were running. It must, however, be remembered that the prewar numbers included many small works.
- (d) The Porcelain Industry consumed 60,000 tons of coal a month in 1913, to-day it has an allotment of 34,000 tons, but it actually receives barely 25,000 tons.

The industries quoted all obtain their raw materials in Germany, and three of them are of exceptional national importance in view of the housing question, while the Porcelain Industry is needed to help in the creation of foreign credits.

It is realised that no help can be expected from coal imports, and all efforts are to be directed towards intensive production and improvement of quality, coupled with an increase in the efficiency of transport.

The coal and railway problems are very intimately connected. Without locomotives and trucks coal cannot be moved. The number of trucks requiring repair at the end of 1919 was 75,000 to 80,000, only half of which could be accommodated in the shops, the remainder standing on sidings and unused tracks, where they deteriorate and are stripped by the population. The conditions in the locomotive repair shops were steadily getting worse. The number of locomotives needing repair, but on which work had not been commenced owing to the idleness and indifference of the workmen, had risen from 1,700 during the second half of 1919 to nearly 2,000 by the middle of January, 1920. Matters have now reached such a pitch that the Government has closed some of the most important shops, such as the one at Nied near Frankfurt-on-Main, because they did not even cover running expenses and because it was felt that nothing short of this step would have any effect on the stubbornness of the workmen.

SHIPPING.

Before 1st August, 1914, Germany possessed sea-going steamships and sailing vessels of a total gross register tonnage of 5,108,600 tons. After delivering to the Allies all ships over 1,600 tons and half of those between 1,000 and 1,600 tons, she retains a total of 501,910 tons, a tenth of her pre-war tonnage; 25 per cent of this residue consists of tugs, lighters and trawlers. Apart from the difficulties created by the shortage of fuel and material, and by labour troubles which were particularly marked on the

coast, the uncertainty of the interpretation of the peace terms has prevented German shipping companies from developing any great activity, except in the construction of small vessels under 1,000 tons which can be used in the carrying trade in the Baltic, North Sea, and Mediterranean. Under these circumstances the Hamburg America Line and the Norddeutscher Lloyd have been forced to adopt a waiting policy with regard to building, though there can be no doubt that they will come forward with strong programmes when the general industrial and economic situation permits and when they feel secure from interference by the Allies. In the meantime they are endeavouring to regain a partial control over their former fleets by undertaking agencies for such lines as are running the vessels which used to belong to the German companies.

The issue of five million marks of preference shares by the Hamburg America Line was not the result of a need for capital, but was one of the many cases in which the issue of such shares was undertaken to protect a concern against foreign influence. The shares possess multiple voting power (in this instance said to be 30 votes per share) and are allotted to original shareholders only who may not resell them without the consent of the Supervisory Council (Aufsichtsrat). There is, however, another feature of interest connected with this issue of the Hapag, as the five million marks of preference shares were exchanged for a similar amount of preference shares of the Hamburg-South America S. S. Company. Thus each company has the predominant influence in the other, while they mutually protect each other against foreign interference. In August, the Hapag dismissed as from 1st October large numbers of its employees; it continued, however, to pay them to the end of the year. At the beginning of 1920, the Hapag definitely acquired the Levant Line with which it had had a working agreement for many years past. This amalgamation was carried out in order to facilitate the process of reconstruction which, it was considered, would be favoured by the consolidation of German shipping companies.

The Norddeutscher Lloyd, while being in the same position as the Hapag, does not appear to have done more than continue work in those directions where it was possible for it to do so. For the time being too it has not entered into fresh combinations and has contented itself with the arrangement it had made with the Hapag shortly before the war. The Norddeutscher Lloyd state that their "European business," particularly coasting and inland water traffic, was good, and that after the German Admiralty had returned some of the company's ships they were able to extend their towing service in the North Sea and the Baltic in the summer of 1919.

The future of German shipping is universally regarded as full of difficulties. The building of a new merchant fleet will be many times as expensive as formerly for a long time to come; while on the other hand, freights are likely to fall. A great outlay of capital will thus produce steadily declining receipts. The productivity of the German yards, which are the only ones available on account of the exchange question, is unfavourably commented upon, partly on account of disinclination to work amongst the men and partly owing to shortage of coal and material. Further, Germany is obliged to build up to 200,000 tons per annum during five years for the use of the Allies.

GENERAL CONCLUSIONS.

The Report with which we have been dealing is not exhaustive. It treats of the dominant factors in German economics and industries and shows the condition of paralysis to which that country has been reduced by the losses and liabilities of the war. The industrial machine is intact, but the wheels are turning very slowly. Even when the necessary raw materials are obtainable within the country the shortage of fuel and the reluctance of labour to exert itself reduce production to a fraction of what it was before the war. The collapse of credit makes very difficult and costly the purchase from outside Germany of materials for industries dependent upon foreign supplies. The Report sums up the situation as follows:—

Germany has very nearly ceased to be a purchaser owing to the state of her exchanges, and we are presented with the spectacle of this country in urgent need of food and raw material lying impotent, unable either to satisfy her own requirements or to relieve her neighbours of accumulations which are rapidly becoming a burden to them. As Germany cannot buy, so also she cannot produce; she is, therefore, as long as present conditions last, not a serious rival, neither is she able to pay what she owes as reparation.

If she is left to herself, it may be regarded as certain that Germany will be permanently crippled both as consumer and producer; while she would thus disappear as a competitor, she would become a danger spot in the centre of Europe, spreading industrial decay on all sides. There can be no doubt that such an eventuality is undesirable, and the question therefore arises, how it can best be avoided. The answer is summed up in the words "by putting her in a position to produce," but the methods how to put it into practice is fraught with extraordinary difficulties, not only on account of the magnitude of the task itself, but also because Germany is merely one of several countries who need similar aid. Germany is still perfect industrial machine, running at low

speed it is true, but undamaged as yet in its vital parts, and would respond rapidly to any stimulus.

Although tempting, the mere investment of capital in the purchase of factories, etc., in the interior of Germany should not be undertaken without the most careful consideration as to the fuel supply, the labour situation, the burden of taxation, and the probability of restrictive legislation. Most concerns, which are worth buying, have taken precautions to prevent the intrusion of foreign influence, and certainly do not seem inclined to sell voluntarily any longer, though there was a tendency to do so in the first uncertainty after the Armistice.

THE MECHANICAL EQUIPMENT OF TOBACCO FACTORIES

A Correspondent writes to the *Near East* :—

After the introduction of tobacco to Europe by Christopher Columbus, smoking in any form remained for a long time a luxury of the rich, and it was not until the last few decades that indulgence in the habit has been within the reach of all. This revolution has been made possible by the introduction of the same factor that has been responsible for most of the developments of the nineteenth century—machinery, which has placed the tobacco industry in the leading position it now occupies. Without the use of machinery it is no exaggeration to say that four-fifths of the people addicted to the "weed" in one form or another, would have to go without, as their requirements could only be satisfied by armies of workpeople.

The remarkable strides made have been entirely due to the invention and perfection of automatic machinery, which can justly be regarded as the product of marvellous mechanical ingenuity, for in spite of the varied and delicate operations necessarily involved in the making of a cigar or cigarette, the terms "intricate" or "complicated" could hardly be justifiably applied to the machine which automatically produces highly finished cigarettes from a reel of cigarette paper and bulk tobacco at a rate of 36,000 per hour, or that which turns out 480 cigars an hour from tobacco leaves.

It is generally recognised that, in view of the highly sensitive nature of the tobacco plant, the less the leaves come in contact with human hands the better, in addition to which, of course, there is the question of purity (a point to which responsible

tobacco manufacturers attach the utmost importance), and it speaks volumes for the high degree of perfection attained in present-day tobacco machinery that "man-handling" is practically non-existent, and every precaution is taken to avoid every risk of tobacco being contaminated and tainted by contact with oil from bearings, etc., or other extraneous matters.

The tobacco industry has now been brought to a fine art—or perhaps it would be more appropriate to term it a science, for certainly no known scientific subject needs more consideration and care than the rearing of the tobacco plant, the lengthy preparations for its ultimate purpose and subsequent manufacture into the finished article ready for the consumer. A period of about five years elapses between the planting of the seed and the manufacture of the product into cigarettes, etc., and during all this time unremitting care is necessary to retain and improve the natural fragrance of the leaves and bring them into proper condition for smoking, this end being assisted by periodical treatment in one type of machine or another.

It is the final process, no doubt, that is of most interest to smokers—the actual production of cigarettes. The various operations are surprisingly simple. The tobacco, already "shredded," is put into a container, technically termed a "hopper," placed above the machine, whence internal rollers regulate the "feed" to a smaller "hopper" situated below, and from which the required quantity of tobacco falls upon, and is carried along by the cigarette paper. Passing along both paper and tobacco enter the larger end of an elongated cone-shaped tube, and as it proceeds through one side of the paper is wrapped round the tobacco leaving the other edge projecting upwards for treatment by the "automatic paster," which deposits a very small quantity of special paste. Continuing further this pasted edge encounters a shaped block, which wraps it round the cigarettes. The seam is then sealed and dried by means of an electric or mechanical drying device. There is then a long paper-enveloped tobacco "rod," and the only remaining operation is the cutting off of the cigarettes to the predetermined length. This is performed by a high-speed circular knife, ground to razor-edge keenness, and operated vertically and horizontally by cams and levers in unison with the rate of egress of the "rod." The finished cigarettes are then ejected into the "catcher" at the rate of ten per second.

A highly interesting feature of a machine such as that described is the printing device which stamps the name or trade-mark (or both), invariably found on cigarettes of every type and quality, often in two colours. This forms an integral part of the machine,

and consists of small dies located on rollers adjusted according to the length of the cigarette being made, and where a two-colour design is to be printed, in register one with the other. The cigarette paper strip passes under these dies in its passage from the roll to the "hopper." Another adjunct frequently encountered in this highly developed machine is an automatic device for affixing gold, cork, or paraffin tips.

MADRAS INDUSTRIAL SCHOLARSHIPS.

The Madras Publicity Bureau in a note says:—

At the instance of the Director of Industries the Government have approved a revised scheme for the award of industrial scholarships. The principal features of the revised scheme are as follows:—

Industrial Scholarships will in future be awarded by the Director of Industries to pupils learning a trade or profession in recognized industrial schools or to selected apprentices (boys or girls) serving properly arranged apprenticeships for a specified term of training in workshops or mills where provision is made for the apprentices receiving class instruction in working hours for not less than 4 hours per week in subjects calculated to improve their value as artisans or operatives on completion of their training. The aim of these scholarships is to encourage deserving apprentices and pupils to complete their whole apprenticeship or period of training at one institution or workshop and so to some extent to check the present tendency of apprentices to move from workshop to workshop in search of a few annas increase in wages to the detriment of their training and the annoyance of their employers.

2. For the present, sixty scholarships will be awarded per annum tenable in approved schools or workshops or mills for a period of 5 years or such shorter term of apprenticeship as may be usual in the particular trade or occupation.

The scholarships will be of the value of

Rs. 1-8-0 per month during the 1st year of training.				
Rs. 2-0-0	do	do	2nd year	do
Rs. 3-0-0	do	do	3rd year	do
Rs. 5-0-0	do	do	4th year	do
Rs. 7-8-0	do	do	5th year	do

A bonus equivalent to 2 months average scholarship will be granted for each year of training to such apprentices as satisfactorily complete the whole

period of training agreed on at the commencement of the scholarship.

The conditions of award shall be as follows:—

1. All scholarship holders shall be on probation for six months, after which the scholarship will be confirmed or withdrawn after consideration of a report from the employer or teacher regarding the scholar's work. Scholarships will ordinarily be granted to members of the artisan castes or to others whose families are already in the trade.
2. No scholarship will be granted to candidates who are over 17 years of age at the commencement of their apprenticeships, but in the case of Mohamedan candidates, the age limit may be raised by 2 years.
3. The general educational attainments of candidates should be such as would enable them to profit by the training provided. Ordinarily a Standard V pass in the Primary grade will be regarded as the absolute minimum, but the nature of the trade to be followed, the pecuniary circumstances of the candidate, and his general fitness for the work will be taken into account in deciding whether a candidate is qualified for the scholarship.
4. The candidate and his guardians must enter into an agreement with the employer that he will faithfully fulfil the conditions of apprenticeship, and unless prevented by sickness or other circumstances beyond his control, serve the full term of apprenticeship that may be agreed on.

GENERAL REGULATIONS.

3. Applications for scholarships should be submitted by the head of the institution in which a candidate is studying or intends to study or by the candidate's employer or his manager on or before the 15th April in each year. Applications should be accompanied by a 'clearance' certificate from the school last attended and by such other particulars as are likely to assist the Director in coming to a decision, and should be made on forms which may be obtained from his office.

4. The names of selected candidates will be notified by the Director of Industries in the Fort St. George Gazette. Each scholarship will come into force on the 1st July.

5. Government trust that employers of labour will co-operate with Government in this scheme to the extent of conducting recognized classes in their works during working hours or allow their apprentices time off duty to attend classes in the Madras Trades School or any other place where suitable training is provided.

6. Works schools and classes will be eligible for recognition and for a Government grant provided they are conducted to the satisfaction of the Director of Industries, irrespective of the number of scholarship-holders in attendance.

CO-OPERATIVE FINANCE.

The following has been sent to us by the Madras Publicity Bureau:—

The ordinary financing arrangements of the co-operative banks in the Madras Presidency are described below :—A primary co-operative society on unlimited liability basis is usually empowered to borrow money to the extent of one-eighth of the net assets of the members of such society while a primary society on limited liability basis is empowered to borrow to the extent of 5 to 8 times the paid up share capital of the society. The borrowing may be in the shape of local deposits or as loans from central banks. As deposits do not come into primary societies as freely as one would wish, central banks were started with the object of raising the credit required by the primary societies in the market. These central banks are limited liability institutions whose sole object is to finance co-operative societies. These institutions get money by deposits tenable for a period of one to three years and they are lending the money to co-operative societies ranging from a period of one or to a period of 10 years. These arrangements can be satisfactorily kept up only when there is a free flow of deposits far in excess of the outflow. To obviate the difficulties which the central banks may feel in returning deposits on the due dates of maturity, the help of the Madras Bank was availed of and it has been generous enough to give overdrafts to well established central banks with proper management and with a back ground of a large amount of paid up share capital.

The Madras Provincial Co-operative Bank is a federation of various central banks in the Presidency and it is intended to connect the co-operative movement with the larger money market in the Presidency town. In view of helping the Provincial Bank to take deposits for shorter periods and lending them to district banks for such longer periods, the Madras Bank has been generous enough to allot a very large amount as overdraft to be drawn upon by the Provincial Banks in times of emergency. Besides, these institutions which conduct banking by deposits have been allowed the privilege of keeping fluid resources in the shape of an undrawn overdraft with the Bank of Madras. The Madras Bank has allowed overdrafts to various district banks in the Presidency and the Madras Provincial Bank as shown in the statement appended. Thus it will be seen that the co-operative movement and the financing banks have benefited considerably by the arrangement of an overdraft with the Madras Bank. In fact the period

of financial stringency experienced during the months of January to June 1920 was surmounted by the help of this overdraft.

Name of Bank	Amount of overdraft allowed
Madras Central Urban Bank ...	12 lakhs.
Salem District Bank ...	1½ lakhs.
Christian Central Bank ...	25,000.
Kistna District Bank ...	1 lakh.
North Arcot District Banking Union ...	2½ lakhs.
Nellore District Banking Union...	10,000.
Anantapur District Banking Union	50,000.
Malabar District Banking Union...	50,000.
Vizagapatam District Banking Union ..	30,000.
Chingleput District Banking Union ...	1 lakh.
Madura Ramnad District Banking Union ...	1 lakh,
Tanjore District Central Co-operative Bank ...	1 lakh.
Viziavad District Central Co-operative Banking Union ...	10,000.
Ellore District Central Co-operative Banking Union ...	10,000.
South Arcot District Co-operative Banking Union ...	30,000.
Trichinopoly District Urban Bank.	2 lakhs.
Coimbatore do ...	2 lakhs.

CORRESPONDENCE.

To

The Editor,

Mysore Economic Journal, Bangalore,

The Teaching of Religion and Morals in Schools.

Sir,—For some time past a systematic agitation has been kept up in the State for the teaching of Religion and Morals in schools and the question was also discussed in the Education Committee of the Mysore Economic Conference and as a result of it a "Note on the teaching of Religion and Morals in Schools" was published by that august body as a guide for the introduction of the subject in all the schools of the State. They generally believe and unhesitatingly assert that a good deal can be accomplished if this is included as a subject in the curricula which is already top-heavy. Before pronouncing any decision as to the advisability or otherwise of the teaching of Religion, let us analyse and see what

relation Religion in its accepted Vedic sense bears to morality and morality to religion;—the conditions, environments and materials available with which religious instructions can be imparted.

The sources of Hindu Religion are the Vedas. "It is pre-eminently the worship of Nature in its most imposing and sublime aspects." Vedic Religion "is one common to the highest thinking that the supreme truth of all existence is a Being or an existence beyond mental and physical appearances, a Spirit, a Self, an Infinite, an Eternal, a one transcendent, universal, original and sempiternal Divinity and that Soul, Nature and Life are only a manifestation or phenomenon of this self-aware Eternity." Further it is that which sees "the Supreme altogether and in all ways and grow to be at one with Him, that is the eternal religion." "The Vedic religion is the knowledge, the recognition of the eternal principles of being, of God, of spirit and matter and their relation to one another as revealed to them in the Vedas."

Can such an intricate, deep and subtle subject as the Hindu Religion be entrusted to men of mediocre attainments with scanty materials? It would be like a layman administering medicine to an invalid without diagnosing the disease for which he wants to administer the medicine. The consequence, if so administered, needs no mention. The patient would do well without it. Further the teaching of religion as suggested in the "Note on the teaching of religion and morals in schools" issued by the Education Committee of the Economic Conference is objectionable and unprecedented. It lays down that "there should be in the class room no regular teaching or any discussion, but there should be on the part of the teacher only reading, explaining and illustrating such stories and incidents from sacred books as are acceptable to all the communities and are likely to find reverential hearing on the part of the students." Is not the spirit of enquiry in a student healthy and creative? Was not Tharka Sastra a favourite study with our ancestors? Why then should we deny this privilege to the present day youth? We cannot and should not thrust upon the unwilling youth the yoke of this unproductive and undiscernible burden which would crush him down. Shatter the fetters and restore freedom; nourish the youth and behold the Perfect Man.

Religion should be lived in and realised but cannot be taught in set lessons as some seem to think. The religious experience, the community of a Soul with God, arises out of the moral experience, the character, developed in relation with the world. Morality is indispensable to religion, religion is the natural outcome of morality and religion is not, as it is said in the Note, "the basis of a good moral character

and high moral ideas." Religion—the realization of the self in man, the fusion or unity of this self in man, the fusion or unity of this self with the Supreme, is not and cannot be the basis but it is the Goal—the Eternity. Morality—true pre-eminence in morals, is the basis, the foundation that could stand the strain of life's struggle for a structural construction towards self-realization of the Atman in man. Two house-hold terms of daily use "Being religious" and "moulding character" strengthen my argument further that religion should be lived in and character moulded or cultivated.

To quote here a passage from *Hindu Superiority* by Har Bilas Sardar may not be out of place. "True religion which is only another name for Gyana or true knowledge, is a necessary result of *pre-eminence in morals*, philosophy, literature, science and general culture." This then settles the question that morality is all prominent, necessary and the very lever of religion. It is the seed from which grows religious experience.

It is confusion and superstition to say that a purely moral instruction is impossible on the ground that "the peculiar social and religious conditions of the Hindus make it really difficult to teach morality without a basis of religion." "Spiritual truth," says H. B. Sardar, "has been in its whole largeness and living sincerity the property only of a few thinkers, mystics or exceptionally gifted spiritual nature, while the mass of men have had no perception of it, but lived only in the lower sectarian side of religion, inferior ideas of the Deity or in the outward aspects of life." He adds, "nothing can be more untrue than to say that the general religious mind of India has not at all grasped the higher spiritual or metaphysical truths of the Indian religion and has lived always in the externals only of rite and creed and shibboleth." We may talk piously and learnedly and use high sounding words which would bubble with meaning, we may argue and debate with all the zeal of a scholar, but knowledge of God arises only from purity of heart and no amount of learning would bring blessing to him who is deficient in good conduct. Knowledge of God is an experience which is superinduced on pure heart—the virtuous man alone can know God."

True religion is for the higher souls—the mystics and the saints. And it is they that are fit to teach. In the absence of these it is advisable to leave religion alone, for, to teach religion in its true sense is beyond reach so much so that we are unable to square up our necessity by manufacturing a stream of sannyasins or a set of ideal men who will "teach to keep the reality vivid and resist the deadening weight of form and ceremony." And further, it is undesirable to stuff young minds with "the lower

sectarian side of religion, inferior aspects of the Deity or the outward aspect of life." Let us leave this alone to be blossomed in the later life of the youth with the growth of virtues in him and look to the cultivation of virtues which would fit him, when matured, to know himself.

Moral Education, as in Japan, of a purely secular character which, would have "much of the practical Code, kept clean and free from the admixture of abstruse metaphysics or the mystic dogmas of contentious creeds," may conveniently be introduced in the schools of our State. Religious instruction can never be possible to give without prejudice to one's faith and except of a sectarian type. If introduced, it would seriously jeopardise the whole system. This threat is not without its grounds. The experience of the State in this direction would justify my threat. What then does the State's past 11 years of experience show? "The experience of the past 11 years indicates that the scheme especially as regards religious instruction, has not been a success." Let us enquire a little more as to how this scheme fared with the teachers and the students. The note runs thus: "Teachers have evinced little interest in the teaching of these subjects and it has often been that students, especially in High Schools, are trained to scoff at religion rather than look up to it in reverence." And let us also see what the conclusions arrived at by that responsible body by their experiment of the scheme. They deplorably state that "Even moral lessons which would have been a fair success if they had been taught on a purely secular basis as in Japan, seem to have suffered by raising controversial religious points in class room." This then is our experience. Let us now go out and look into the teaching of religion in other countries, "In England, the united Biblical teaching in undenominational schools does not seem to be a success, as this united teaching would have to serve the greatest common measure of a great variety of beliefs and as it can never embrace the whole of ideal religious education of a child." "In Italy the device adopted is to provide religious instruction only to those pupils whose parents desire it." To be more precise, "in Western countries social service is almost assuming the place of religion." When countries like England, Japan, Italy, etc., with the special advantage of being a homogeneous whole in religion, language and nationality find it difficult to successfully teach religion in schools, just imagine, how much more so difficult it would be for us to introduce religious education without diverse religious beliefs, etc.

I should like to point out here why such disastrous results were the consequence of the introduction of religious education in the schools of the State. "A

spirit of reverence and devotion" is only possible and productive in a healthy ideal atmosphere. Moreover, the most essential things of all lie in the personality of the teacher—whether he who teaches be parent or teacher—in sympathy, in moral insight, in candour of heart, in self-discipline, in consistency of conduct and largely in the corporate life of the School.

Nothing appeals to me most at this juncture as the best suited than to copy the wise policy of Japan by forbidding religious instruction in public schools and introducing moral education which would encourage and promote the practice of virtues. Civics and a well set out "Youths' Code of Honour"—a wide spread Scout Movement would go a long way to inculcate the youths of the country to live a life which will contribute to the common good of the humanity at large.

A. R. JAYARAM,

Sivan Chetty Garden, Bangalore.

INDIAN ECONOMIC ASSOCIATION.

Sir,—Arrangements are already in progress for the Fourth Annual Conference of the Indian Economic Association which is to be held in Allahabad during the four days from December 29th next to January 1st. The University of Allahabad has very kindly offered the use of the Senate Hall and Lecture Rooms for the meetings. The spacious compound of the University with its beautiful trees will form the pleasantest surroundings for the meetings of the Conference.

A Reception Committee is to be formed at an early date and convenient arrangements will be made for members who attend the Conference. Excursions will be arranged to local factories, typical villages, and to places of interest like the Fort.

The subjects on which Papers are being invited to be read and discussed at the Conference are the following:—

- (1) Finance, Banking, Exchange and Prices;
- (2) Labour questions;
- (3) The Improvement of the Teaching and Study of Economics in India;
- (4) Rural Economics: especially rents; the economic status of land revenue; and the relation of rural indebtedness to prices.

Persons desiring to become members of the Association may communicate with the Joint Secretary, Professor J. C. Coyajee, Presidency College, Calcutta, or with Professor H. Stanley Jevons, Honorary Local Secretary, The University, Allahabad. The annual subscription is Rs. 12. Local residents and students may be admitted as Associates on payment of Rs. 6 to the Honorary Local Secretary. They will be entitled to receive the printed volume of Proceedings of the Conference.

H. S. JEVONS,

Hon. Local Secretary.

16 Thornhill Road,
Allahabad,

17th August 1920.

BOOKS IN BRIEF.

A History of the Indian National Movement—By Sir Verney Lovett K.C.S.I. Late I.C.S.,
Published by John Murray, London.

We are rather disappointed with this book, good as it is in some respects. Its title expected us to find in it traced the etiology of the National movement in India. It, however, has in fact a much restricted scope. It does not do more than chronicle the superficial growth of the movement. But we have no cause to complain. Sir Verney disarms criticism when he says:—"Throughout I have felt the extreme difficulty in appraising and setting forth fairly the ideals and mental processes of men not of my own race." The book is accordingly one made up largely of extracts from the speeches and writings of Nationalist Indian politicians and is, in so far as it is so, a valuable hand-book of their thoughts and feelings. Into the topics dealt with in the book, we feel we have only a few words to say. The Economic stress in India, its contribution to the origin and growth of nationalism and the need there is to give particular attention to it is the great desideratum of to-day. This we find not adequately or directly treated of by Sir Verney. This, on analysis, will be found to be at the root of much of the politics of India. The book lacks an Index badly and we shall be glad to see one given to it when a second edition is called for. Another suggestion we would hazard. Sir Verney would do well when he revises his book for the next edition to get a chapter included in it by a known Nationalist of standing and status giving an outline of his position in the politics of the land.

The New Economic Menace to India—
By Bipin Chandra Pal—Published by Messrs.
Ganesh & Co., Madras.

This is a counterblast as it were to Sir Verney Lovett's book we have reviewed above. We do not agree with Mr. Pal in all that he writes or says but he is undoubtedly on firm ground when he rests his Nationalism on the Economic issue. Sir Verney, would do well to give this book his attention. Let him read what this protagonist of Nationalism says generally and particularly on pages on pp. 220 and 224 and he will see how his presentment of the Nationalistic case is weak. This, however, is only by the way and we have only space here to add that Mr. Pal's views are put forward in his usual trenchant style and will doubtless attract much attention. Though it comes easy to a publicist like him to cast his book in the controversial style, it is always a

disadvantage to have it so put for another's dispassionate consideration. Mr. Pal's constructive portion is in the last pages of the book to which we invite attention.

Value for Money—By W. Schooling, C.B.E.
Published by Sir Isaac Pitman & Sons, London.

This is a suggestive little book on the influence of wise spending on national prosperity. Mr. Schooling has the following tag taken from Plato on the title page of this book:—"Each of us is not put into the world for himself alone: at the call of the father land it is impossible not to follow" The book is devoted to the work of the National saving movement, with which Mr. Schooling is closely connected. A movement like this ought to be initiated in this country, for the waste we indulge in is something appalling. To those interested in the subject, a better book cannot be suggested. We wish some public spirited people took up this work in earnest.

Historical Sketch of the State Ownership of Railways.—By W. M. Acworth. *Published by Mr. John Murray, London, Price 3sh. 6d. net.*

This book, written by so competent an authority on railway Economics and railway systems of England as Mr. Acworth is, is sure to find many readers in India where a systematic agitation has been going on for some time in regard to the State taking over the management of railways. Mr. Acworth summarises in a brief space the history of State ownership in most western countries—India we do not see even mentioned—and compares the efficiency of private and public management between France and Prussia and as between Australia and Texas. He shows that in democratic states, political influences have always interfered with business management. Following Mr. Justice Sankey's scheme for the management of the coal mines, he suggests the possibility of management, not by the people, but for the people. It is here that the constructive hand is disclosed by Mr. Acworth. The suggestion put forward by him is one well worth consideration even in the country where the case for State management though clear is not likely to be won easily. A compromise of the kind seems to stand a better chance of success. The book wants an index, and we should be glad to see one supplied when a new edition is called for.

ACKNOWLEDGMENTS.

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PROBABLE TREND OF FUTURE PRICES.*

BY GEORGE E. ROBERTS,

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New York.*

I am not undertaking any extended or elaborate discussion of abstract theories concerning prices, but rather a brief and simple discussion of the salient facts of the present situation in as practical a manner as I can present them.

The main facts of the situation and the fundamental reasons for the rise of prices are known to all. They have resulted from the war. Millions of men were drawn from the productive industries and into the war of industries. Ordinary industry was interrupted, and production of the common commodities of consumption has been largely reduced. Communication between countries has been interrupted. A great amount of shipping has been sunk. Factories located in one country in many instances have been cut off from the source of supply of their raw materials in other countries.

In short the world's industry has been disorganized, and the connections between countries, the mutual dependence of countries upon each other to which they become

accustomed through long years, have been broken up. This general disorganization of industry has resulted in many instances in an actual increase of the labour cost of producing commodities. Then in addition to that there has been the increase in the money cost, which has resulted from the disorganization of monetary systems and the great inflation of currencies which has been brought about.

The war brought on a practically unlimited demand for labour and materials. As we saw it in this country the Government let contracts right and left and the contractors went out into the markets and bid labour and materials against each other. Furthermore the ordinary commercial demand for private consumption was not reduced, except as it was in the latter days of the war actually choked off; but the great disbursements of the Government and the increase of wages, the full employment of the people, all had the tendency to put a great amount of money into circulation, to stimulate trade, and to create additional demands upon the industries. The banks were called upon as a matter of patriotic duty to lend money freely for the purpose of purchasing Liberty Bonds, and also for the support of industries.

So you see, we had practically an unlimited demand for labour and materials, backed up for the time being by a practically unlimited amount of credit, of purchasing power; and this amount of credit, purchasing power, turned loose upon limited supply

* A lecture delivered in New York.

of labour, because there was no more labour in the country than there was before the war and the limited supply of materials, inevitably brought about the rise of prices. And the situation was very much the same in all countries except that in many other countries they resorted more freely to inflation of the currency than we did. The amount that was raised for the support of the Government by means of taxation was larger in this country than it was in any of the other countries at war.

That is in brief the manner by which this rise in prices was forced, by which it came about; but it may be said that the war has been over for more than a year now and there has been no decline in prices, on the contrary there has been a further rise.

The main reason for it is in the fact that the industries of Europe are so disorganized that they have not gotten back to normal production. The fact is that Europe went almost to the limit of its strength during the war. It exhausted its stocks of goods and materials; it wore out to a great extent its industrial machinery. A great deal of the machinery was actually destroyed or carried away from the place where it belonged. The railroads were crippled, and the equipment worn out. The transportation of Europe is in a broken down condition. The coal-mines were gutted during the war; that is to say, every effort was made to get out the amount of coal immediately required with the smallest possible expenditure of labour, so that development work was not done. I have a friend just back from Germany who told me that between the break down of the transportation system and the limitation upon the production of the coal mines, it is impossible at present to get out in Germany more than about half the coal that the country requires.

Credit in these countries is in a demoralized state; the currencies are depreciated and of uncertain value; and finally the

morale of the people is impaired. The people are anxious and worried, and apprehensive about the future. In many instances they have been inclined to look for relief to new systems of Government, to a change in the social order, rather than to the old time industry.

The fact is, that the world everywhere to-day needs enlarged production. That is the only remedy for the situation. Nothing else that purports to be a remedy can be in any degree effective unless it accomplishes increased production.

Take the case, for instance, of cotton goods, an article of common consumption, and of which prices are very high. We have more raw cotton in this country than we can possibly use. We produce in this country about twice as much raw cotton as our cotton mills can work up and yet there are cotton mills idle in every country of Europe, and the skilled employees are idle and receiving unemployment doles at the hands of the Government, because they are unable to purchase cotton in the United States.

In purchases from another country, you must do one of three things: you must either pay in cash, which in international trade means gold, or you must pay in goods, or you must obtain credit. Europe is not able to pay in gold and not able to pay in goods; they are not able to buy raw materials to make the goods. They must import their raw materials as in the case of cotton: they are not able to import because they have nothing to export, and they can't export until they get the raw materials. It is a case of industrial dead lock. It is a case of needing somebody to prime the pump to get it started, and that is what the United States ought to do. That is the situation as to one great commodity, a necessity, cotton goods; even though cotton should decline in this country, as it may through inability to export our surplus, even if that is the case, it is not certain that cotton goods will go down.

Because people don't buy raw cotton, they buy cotton goods. Raw cotton is one thing and goods are another; and goods are an international commodity, and the shelves are bare of cotton goods all over the world. There is no certainty at all that cotton goods will come down even in our own markets until the cotton mills of Europe are supplied with raw cotton and their people are put to work.

So again, take the case of sugar, another necessity which is at a high price now, although we are producing more sugar in the United States and in Cuba, which is our chief source of supply than before the war. We have ninety beet-sugar factories in operation in the United States this year, and we had only sixty in operation before the war. The sugar crop of Cuba this year is four and one half million tons and in the year before the war it was about two and one half million tons and that was the largest crop they had ever had; so there is a great increase in the production of sugar in our own sources of supply. But England and France and other countries are buying in Cuba now whereas before the war they were supplied from the continent of Europe and the total production of sugar in the world is only about 16,000,000 tons this year as against 18,000,000 tons before the war.

Now we are not going to get sugar at normal prices in the country or anywhere, until the sugar mills of Northern France that were destroyed during the war are rebuilt, and until sugar production is received generally in Europe.

So it is as to many other things that might be named. Take the case of Russia. Russia has been in the past a great source of supply for food and raw materials, for Western Europe. Great Britain and France and all the countries of Western Europe drew largely upon Russia for wheat, for hides and wool and butter and eggs and lumber and other things of that character.

Now that source of supply is entirely cut off. In the last year before the war, Russia's export of that class of goods was of the value of more than a billion and a half of dollars in the prices of that time. That is all cut off, and the world is not going to get back to normal prices, this country is not going to get back to normal prices until Russia is at peace and her people are back to their industries and producing these necessities as they did before the war.

This problem of prices is the problem of getting the people of the world back to work, and of increasing supplies in all markets. Whenever the demands of Europe upon this country for food decline, go back to approximately what they were before the war, prices of food in this country will decline, and they will decline all over the world. I can point to just one illustration of that.

In the first six months of this year the exports of pork products from this country were at the rate of approximately one hundred thirty million dollars a month, but in the last six months of this year, they were at the rate of only about one half of that amount, largely because of the high rates of exchange which make our products cost so much more to those people.

What was the effect of that? Live hogs in the western markets in July were worth about twenty-three dollars a hundred weight; to-day they are worth about fifteen dollars a hundred weight. That is the result of a falling off of the European command.

So I don't believe that these prices are to be considered as permanent in the long run at all. They will last until the world can be gotten back into production, and I am hardly able to predict how long that will be. But I think that whenever the foreign demand for our food products falls off, inasmuch as food products are the basis of the entire economic structure, other prices will come down also, I know that it is very commonly said that prices are always going to remain

high because wages have advanced and that wages will never be reduced. But however much we may desire that wages shall be high, the economic law at last will make itself felt.

The great purchasing power of the farming districts of this country to-day is the most important factor in the industrial activities of the whole country. The big buying power of the great interior of the country which is directly related to the farm is the principal factor to-day in the great demand for goods which is keeping these industries throughout the East busy and which makes the manufacturers ready in great wage increases which they can immediately recover in the prices of the goods.

But if the value of what the farmer grows and has to sell is to be cut in two it is not going to be just that he shall continue to pay war prices for what he buys. He will not be willing to do it, and what is more he will not be able to do it, even if willing; he won't be able to buy; in the aggregate more than one half of the wage-earners will be out of employment (one half of those who are supplying that portion of the population) or there will have to be a reduction of prices and the general scale all round.

So, there briefly and concretely is my opinion of what we may look for—that as Europe gets back to production, which is not going to be right away, we may expect a general decline in the price level. I don't think the prospect for the coming year for a reduction of prices is good. The crops of Europe for the coming year cannot be full crops. Russia is not going to be back into normal production during the coming year. Even the prospect in the United States for the next wheat crop at this time is not very good, because the acreage is 23 per cent below that of last year and the crop did not go into the winter in very favourable condition.

There is one other factor which has bearing upon prices in the near future, and that is this question of credit to Europe. Europe needs to buy heavily in the United States for the coming year; but the question of her ability to buy, of how the purchases are to be financed, is a very difficult one. It has not been solved. The discount upon European currencies is very heavy, making their goods bought in this country cost in many instances double the price which they cost us here at Home. We think that prices are high here, but how can the people of France afford to buy goods here when they must pay not only our prices but a premium of 100 per cent to get a draft on New York and pay the high ocean transportation besides? We don't want our prices to go down because we are unable to fill the needs of Europe. That will be the effect if these credits are not supplied. In that even I think there will be an early decline in the general prices of goods and the price-level, and something of a reaction in a business in the United States. But I say that, much as we should like to have prices go down, we don't want prices made low as the result of the congestion of products in the markets of the United States while people are starving for them in Europe. Moreover that is not the road back to normal conditions. That road is by helping the people of Europe to become self-supporting again, to provide for themselves and to increase production for the whole world.

I think your societies are especially interested in China, where the exchange rates are now very high. China is a silver-basis country. Any payments that are to be made in China must be converted into silver and the price of silver is more than double what it was before the war. Silver as a commodity, has been subject to the same influence that have affected other commodities, but it has been subjected to some special influences besides. For one thing, the troubles in

Mexico have largely reduced the production of silver in that country, and it is one of the chief silver-producing countries of the world. The production of silver in Mexico fell from about seventy million ounces a year down as low as twenty-five million ounces a year; but this last year I understand the production has been larger.

Then again the rise of prices and the general trade activity, the increase of wages, has made it necessary to coin a great deal more silver for use as money. Silver is the pocket money of the whole world. It is the money of retail transactions. Taking our own country as an example, for the five years prior to the war the average consumption of silver for coinage in the United States was about three and one half million ounces, a year, and for the five years beginning with 1915, the average consumption in this country has been about twelve million ounces nearly four times as much; and just about the same ration exists in Great Britain and also in France. The consumption of silver in 1913 in Great Britain for coinage was about five million ounces, and last year it was 28 million ounces. So that in all these countries there has been a great increasing demand due to the rise of prices, the full employment, the higher wages, and all of that; but beyond that the greatest demand has been from Asia. The exports of Asia have increased during the war, and, through their inability to buy and to get deliveries of goods, their imports have not increased in the same proportion, so that there has been a large balance of trade in favour of Asia which had to be settled in silver. That has made an extraordinary demand for silver which is still maintained.

Now as to the future of silver, I would say that the demand for coinage purposes is certainly going to be very much less, because the price of silver has reached the point where silver is worth more as bullion than

it is as coin, at the coinage ratios that are used in all the important countries; so they can't afford to coin it into money and they are put to the necessity of either abandoning the use of silver, or taking nickel or some other metal for use as money which they can do for token coins, or of reducing the amount of silver in their coins by putting in an alloy. The consumption of silver for coinage purposes is going to be very much less. As to what the demand will be from Asia, it is impossible for any one to predict; but at the present it seems likely to be heavy for some time to come. So that I don't predict or look for any improvement in that situation for the year to come, and I don't look for any large change in the situation for the coming year, but I do believe that the present situation is normal and artificial and due to the war, and due to the fact that the people of the world are not producing goods at the normal ratio, and that as Europe gradually recovers her production, we will find the prices of all products, silver included gradually.

I have given some attention to the general effect of the inflation of the currency. That was a factor in the rise of prices, and it will be a factor in retarding the decline of prices; but as production increases and as these nations get their budgets balanced so that they will no longer be printing paper money to pay their expenses, and as people begin to save and accumulate capital, we shall find the currency gradually reduced. The accumulation of capital is one of the most important factors in the situation, although it seems to be the fashion nowadays to think that we haven't very much use for capital, but when you consider what capital is, that it is simply a form of property which is used in production, that it is machinery and equipment for producing the things that the world needs, you will understand that we need more of working capital.

In conclusion, I would say that one of the

great lessons of the war is that of the mutual dependence of the countries, that the peoples of the world have an interest in one another, that the greatest prosperity for any people can only be secured at a time when all other peoples are having the greatest possible prosperity. We have seen the nations at war making every endeavour to destroy property belonging to their neighbours, their enemies at the time; and now that the war is all over, we see that they are all alike the worse for it, that the world can only come back into its former life by bringing back every nation, Germany included. It is a great mistake to think that the people of Germany can have everything taken away from them and be made helpless and ineffective and unproductive and that the rest of the world can benefit by it. They can't do it. Germany has got to be made able to help herself and to become a useful factor in the world again.

H. M. Commercial Commissioner at Vienna has forwarded information which includes plans and diagrams in German regarding the new Austrian Government Bill concerning the electrification of the Austrian State Railways, together with supplementary matter. This Bill was introduced on 15th July in the Constituent National Assembly and provides for the electrification of 650 kilometers of the western part of the railway system by the end of June, 1925, at a cost of 5,096 millions of crowns, to be raised by loan. At a later date 1,135 kilometers are to be electrified.

AGRICULTURE IN TRAVANCORE.

BY "RUSTICUS."

THERE could be no better testimony to the progressive character of the administration of the Travancore State than the fact that, although it is only 7,129 square miles in extent, it spent some Rs. 95,000 on its Agricultural and Fisheries Department in 1918-19. The Report of the Department for that year shows that it got good value for the money. The energies of the Agricultural Branch were naturally mainly devoted to work on the two principal crops of the State—coconut and paddy. In this connexion, we would suggest that it would be helpful if, to reports of all agricultural departments, whether of British Provinces or of Native States, were prefixed a statement or better still a map showing the distribution of the most important crops and their relative importance. We should imagine that, in Travancore, it would be a case of coconut and paddy first and the rest nowhere but we have no means of verifying this. There is, however, no doubt that the prosperity of the State depends in large measure on the coconut palm and that the Agricultural Department is confronted by a serious problem that of eradicating the root disease which has attacked that valuable tree in recent years. So far all that it has been able to do is to prevent the spread of the disease. This it has done by segregating infected trees in isolated localities, by propagating varieties which are disease resistant, by destroying hopelessly infected trees and by improving the general condition of trees by better cultivation and manuring. These measures seem to have been successful in arresting the onward march of the disease, but that is obviously not sufficient. If the disease is to be stamped out, its cause must be discovered. A Mycologist has recently been appointed to the Department whose

first task will be to discover what can be done in this direction. After making himself acquainted with the local conditions, he is to go to Pusa for further training. We are very glad to see this evidence that Native States are willing to avail themselves of the facilities afforded by Pusa. The use of these which has been made in the past by workers in all branches of Agriculture throughout India has, in our opinion, been entirely insufficient. Meanwhile, a special staff is engaged in work on infected trees. Sometimes the disease attacks the outer ring of leaves and sometimes it is the innermost 'cabbage' which is first affected. In the latter case, it has been found that cutting away the rotten portion of the cabbage and spraying the remainder with Bordeaux mixture are sufficient to ensure complete recovery when the tree is only slightly affected but that if the attack is a bad one, nothing can be done. The experiment was only conducted on 85 trees and this brings us to one of the criticisms we have to make on the work of the Travancore Agricultural Department which is that its experiments are conducted on such a small scale that it deprives them of much of their value. The manurial experiments on coconut trees on the Experimental Farm, Trivandrum, which have been longest in progress were confined to ten trees only. These experiments were started nine years ago and, in that period, the average annual output of the trees has increased from 4'4 to 67'1 nuts. The cost of manure is only 5½ annas a year so that, if as is claimed, the whole of this great increase is due to manuring, the results would be of the greatest importance if it were certain that they were applicable on a large scale. But it is impossible to deduce anything from an experiment on ten trees. It is true that there are other manurial experiments on coconut trees in progress at Trivandrum. Details of these are given in an appendix to the Report a study of which shows that the same criticism applies. Only 34 trees are

affected in all and there are eleven different experiments in regard to them. Surely if these experiments are to be of any value in showing how far the application of manures increases the outturn of coconuts, it is necessary to take a large garden with at least 100 trees in it and treat half of it in one way and half in another. Yet another appendix gives notes of observation on the yield of 12 coconut trees in the office garden at Quilon. In regard to this, it seems only necessary to point out that the number of coconut trees in Travancore must run into hundreds of thousands if not millions.

The manurial experiments on paddy were on a somewhat larger scale. One series was intended to test the value of different kinds of oilcake and the other that of green manure and nitrogenous fertilizers. The best results in the first series were obtained from the use of castor cake and in the second from that of 280 pounds of green manure, 17 pounds of ammonium sulphate and 9 pounds of super phosphate on a plot of 6½ cents. These experiments were conducted at the paddy farm at Nagercoil where work on seed selection and hybridization is also in progress. The Director of Agriculture, Dr. Kunjan Pillai claims that, as a result of repeated selection of seed, it has been possible to evolve a strain of paddy which possesses the specific quality of salt resistance. In proof of this, he instances an area of two acres on the farm which was so saline that it yielded hardly any crop when the farm was first brought under cultivation three years ago, but has now begun to yield a normal crop. In 1916-17 the yield was 5,896 pounds. In 1918-19 it was 7,389 pounds. An improvement of about 25 per cent does not seem to constitute the difference between "hardly any crop" and a "normal crop" but that is by the way. What is of importance is the claim that the improvement in yield is solely due to the improvement of seed by selection and the *improvement of soil by scientific cultivation.*

The italics are ours for we have little doubt that the improvement in yield is solely due to the better cultivation and has nothing to do with seed selection. We consider it most unsafe to base any claim to have evolved a salt resistant variety of paddy on the figures given by Dr. Kunjan Pillai. It will be many years before sufficient data on which to base such a claim will be available.

It is interesting to see that the Travancore Department has embarked on the cultivation of cane. A site for a farm at Alwaye, which is said to have once been an important cane centre, though the area under the crop can never have been very large, has been placed at the disposal of the Department and is to be used mainly for experiments on cane. Meanwhile tests of different varieties are being conducted at Trivandrum. Only three out of 22 managed to survive the unfavourable conditions of 1918 and of these Red Mauritius proved the best so that Travancore experience agrees with that of Mysore.

The Travancore Agricultural Department realizes the important fact that the only way to convince the ryot of the value of its work is to carry it out on his land and it has a staff of thirteen officers in all engaged in doing this. At the same time demonstration farms are as indispensable as books of reference and four more of them will shortly be working. The economic planting of paddy has made great progress in Travancore and in South Travancore, the area in which single seedling transplantation is adopted is now so large that exact figures of it are no longer available. Central and North Travancore have lagged behind in this respect but even there this method is followed on 1,000 acres. Selection work in the Government farms has been so successful in improving some of the indigenous varieties of paddy that the improved seed can now be given up with confidence to the cultivators. An interesting development has been the formation of Seed Unions on the lines which have worked so well

in regard to cotton in the Central Provinces and parts of Madras. Thirteen of these Unions have been formed. The presidents of these are supplied by the Department with improved paddy seed which they cultivate on their own land under the supervision of agricultural officers. The produce of the crop is to be distributed amongst the members of the Union. In its work of distributing improved seed and seedlings, the Department is largely assisted by private enterprise. One firm sold several thousand coconut seed nuts and seedlings last year and the sale of the seed of Banku paddy, a prolific variety introduced by the Agricultural Department some years ago is now carried on entirely by the cultivators themselves. The sale of manures is still mainly departmental but, here also, outside assistance is being enlisted and manures to the value of nearly Rs. 8,000 were sold by commission agents against departmental sales amounting to Rs. 22,000. The sale of improved implements was, as elsewhere, much handicapped by the great difficulty in obtaining them and only the balance of the stock in hand could be sold during the year with the exception of four ploughs which were obtained from the St. Joseph's Asylum Industrial Workshops, Mangalore.

That the Veterinary Branch of the Department did very useful work is shown by the increase in the number of patients treated from 4,350 to 6,577. The increase was partly due to an increase in the number of hospitals and dispensaries and partly to a wise revision of the rules regarding the levy of fees. Agricultural live stock are of such importance to the community that the small expense involved in exempting them from fees when treated as outpatients is amply justified.

The Fisheries Branch more than pays for itself. Expenditure last year amounted to Rs. 11,808 and receipts to Rs. 12,700. It has only been in recent years that Governments in India have woken up to the fact

that in their fisheries they possess a very valuable asset. The value of fish and fish products exported from Travancore last year was estimated at Rs. 19 lakhs so that the necessity for a Fisheries Department is apparent. The principal work on which it was engaged was fish curing and 13,500 maunds of fish were cured in the two yards at Muttam and Alleppey. Experiments in smoking fish were also carried on and showed that fish can be preserved in this way for several weeks. The fish oil factory which was started at Alleppey during the year was only able to work for ten days as the price of fresh fish was so high that it was not possible to turn it into oil and guano.

The Travancore Agricultural Department deserves great credit for the efforts it is making to ameliorate the social and economic conditions of the fishermen who, in Travancore, as in all the maritime parts of India, are amongst the most backward classes of the community. The special school for children of the fisher class at Panavally had 71 boys at the end of the year. In addition to instruction in the "three R's," they are being taught net making, coir work and weaving. The profit from the finished products is divided amongst the boys themselves, being temporarily deposited in the co-operative society which is linked with the school until the boys leave when it gives them a little capital with which to start life. The Co-operative Society for fishermen at Pallipuram has made a good beginning. It is intended both for production and distribution. One branch will sell the fish and coir of its members and the other will purchase rice and paddy on their behalf. In this connection mention should also be made of the two night schools which are attached to the experimental farms. They have 29 students, most of whom are day labourers on the farms who were quite illiterate when they joined but are now able to read and write Malayalam and to do simple sums in arithmetic. The Agricultural Department in Travancore is, therefore, doing its best to increase the number of useful members of the community.

PAPER-MAKING MATERIALS IN THE PHILIPPINES.

[In view of the importance of paper making in the Mysore State, where the possibilities of manufacturing paper from the bamboo have been demonstrated to be great, we publish the following article taken from the "Journal of the Society of Arts."—Ed. M. E. J.]

The Philippine Islands produce an abundance of fibres and other raw materials for the manufacture of paper pulp on a commercial scale, but at present none of these is being utilized for this purpose. So far as is known, no paper has ever been made in the Philippines except for experimental purposes. The country also contains plenty of the raw materials required for the manufacture of the chemicals used in paper pulp making, but none of these chemicals is now being produced locally.

More than a decade ago, Mr. G. F. Richmond, for several years attached to the chemical laboratory of the Philippine Bureau of Science, made a very careful survey of the materials available in the Philippines for the manufacture of paper pulp, but, according to a report by the U. S. correspondent at Manila, no practical use has yet been made in the islands of these valuable data.

The experiments made by the Bureau of Science were undertaken with the object of determining the commercial availability, for paper-making, of the fibres from members of the plantain family, such as abaca (manila hemp), banana, and plantain; of maguey (*Agave cantula*); of certain palms; of bamboo; of grasses; of certain woods; and of other less important plants.

Bamboo.—Of all the materials for the manufacture of paper found in the Philippines, the bamboos are the most important, considered from every standpoint. Not only

is the paper made from bamboo of excellent quality, but a constant, adequate, and accessible supply of this material could be made available for a paper or pulp factory more readily than could such a supply of any other material. Its rapidity of growth is an important item among the various qualities that render bamboo valuable as a paper-making material. Experiments were made with the two most important and widely-distributed bamboos. There are the common, thick-walled variety (*Bambusa blumeana*), and the thin-walled, dwarf bamboo, also known as cana bojo, of the genus *Schizostachyum*.

The thick-walled variety is that commonly employed for building purposes throughout the islands. It is planted as a crop along the river bottoms of the Pampangan plain, on Luzon, and in other sections of the Philippines as well. Propagated from cuttings, the plants are set out in rows from sixty to ninety centimetres apart. Marketable culms are produced in from one to two years.

The cana bojo, or dwarf bamboo, is that employed throughout the Philippines for the manufacture of woven products used for furnishing the interiors of *nipa* houses and for other purposes, such as the *sauale*, *quisame*, *amatong*. The cana bojo is found almost entirely within the forested regions of the country and is a veritable forest pest. It is never cultivated, but is cut without restraint in the forest regions to prevent its deleterious effect on forest growth.

In the Province of Bataan there are two contiguous areas of cana bojo, one of them containing 1,200 hectares (hectare=2.47 acres), 800 hectares of which are covered with a dense stand of cana bojo. The other area includes about 650 hectares, of which over 40 per cent is covered with this variety of bamboo. Small areas of cana bojo are found in the same province along the Bataan, Buasao, Pinulot and Bacan rivers, in the basin of the Colo River, and in the basin

of the Mababo or Balsic River. Some of these areas contain a higher percentage of timber trees than do others, and are, consequently, less thickly studded with bamboo. In an average stand of this variety of bamboo there are about 9,000 culms to the hectare. An ordinary green cane weighs 7.2 kilos, and an air-dried cane, without the nodes, weighs 3.75 kilos. A hectare would, therefore, produce about 33.75 metric tons of dried material. Mr. Richmond calculated from his experiments that two metric tons of air-dried material would produce about one short ton of pulp. The yield of pulp would consequently be approximately seventeen tons to the hectare, or nearly eight tons to the acre.

The experiments made by Mr. Richmond developed the following important facts in respect to bamboo as a paper-making material:—

1. The dwarf bamboo (cana bojo) is better than the variety used for building purposes, in that it yields more unbleached pulp and requires less of the bleaching agent to give the best results. The structural bamboo requires from 20 to 25 per cent of bleach to give but poor results, but a satisfactory white is obtained from dwarf bamboo with from 10 to 20 per cent of bleach. This compares well with the results obtained from straws of various kinds.
2. A well-digested pulp is obtained from bamboo by the use of from 10 to 20 per cent of caustic soda, calculated on the gross weight of the stems.
3. The time required for digestion, the pressure and the temperature employed are materially less than those required in making pulp from soft woods by the same

process. In fact, in these particulars, bamboo compares favourably with straw and similar materials.

4. Both the sulphite and soda processes may be employed in working up cana bojo. By the former process, fully 50 per cent of unbleached pulp may be obtained, and that, with the use of much less sulphur than is necessary for the making of wood pulp. By the latter process 43 to 45 per cent of air-dry, unbleached soda-pulp is obtained. The use of caustic soda is recommended for bamboo because of certain difficulties to be overcome in the use of the sulphite process. The results described were obtained by the use of caustic soda under the following conditions: (a) Upright cylindrical stationary digesters; (b) direct live-steam heat; (c) 15 to 20 per cent of 76 per cent caustic soda, calculated on the air-dry weight of the raw material; (d) a duration of cooking of from four to six hours; (e) a maximum temperature 160°C. (320°F.) corresponding to a steam pressure of 45 kilos.
5. Pulp obtained by the sulphite process is not light enough in colour to be mixed with mechanical wood pulp in the manufacture of news-print paper. It is entirely suited in point of colour for use as a wrapping paper. But it is too valuable, by reason of its fibre, to be used for wrapping paper or for the making of newspaper stock. The strength of bamboo fibre makes it specially adapted to the manufacture of book paper and certain grades of writing and lithographic papers. For these

purposes it may be used alone or mixed with rag or sulphite wood pulp.

6. If the bamboo pulp is to be used in the making of book and lithographic papers, the soda process should be employed in its manufacture, because bulk, softness and opacity are the chief features of soda pulp. This pulp bleaches to an excellent white with from 12 to 15 per cent of bleaching powder. The resulting sheet is more bulky than that from wood pulp and possesses a strong fibre 2.5 to 3 millimetres in length—longer and narrower than spruce fibres—and a good felting capacity.

Abaca or Manila Hemp.—The Philippine Archipelago is the home of abaca (manila hemp), the source of all materials from which the genuine Manila hemp paper is made. The plant (*Musa textilis*) is a species of wild banana, of which there are several found in the Philippines. The fibre from this plant is the world's premier cordage material and comprises the chief article of export of the Philippine Islands.

Abaca waste, available for paper-making, is of two kinds, namely, that made up of old worn-out rope, gunny sacks, waste thread, and binder twine made from the fibre; and the true abaca waste, *i.e.*, the fibre that is missed in the stripping of abaca or extracting the fibre from the stalk of the plant. There is very little of the former to be had in the Islands. When abaca waste is mentioned in the Philippines, the term signifies that portion of the fibre that is missed or thrown aside with the stalk pulp at the time of, and in the process of stripping the fibre or extracting it from the plant, either in the hills or on the plantations where it is grown.

Abaco, the fibre extracted from the plant of the same name, is taken from the petioles

or sheath-like leaf stalks, which, wrapped one about another, form the stem or trunk of the plant. The stripping process consists of separating the fibre from the cellular matter of the petiole.

From this process two kinds of waste material are obtained, both of which are of value in paper-making. One of these is called fibrous waste, and the other semi-fibrous waste. The former is made up of the broken, tangled, or lost but clean fibres mixed with strips or bands of fibre aggregates from which the cellular and incrusting matter has not been entirely removed. The fibre contained in this waste has all the qualities of the fibre that is recovered by the stripper and subsequently employed in the manufacture of cordage. It is therefore identical with the fibre contained in rope waste, well known among manufacturers of paper. There is this difference, however; this fibre is fresh and has not suffered the deterioration of age.

The semi-fibrous waste resulting from the process of stripping abaca is due chiefly to the method by which the stalk of the plant is made ready for the stripping process. The plant is prepared for hand stripping by cutting off a portion of each end of the stalk to facilitate the removal of the petioles. Several of the outer of these are usually discarded on account of being bruised and discoloured. The fibre which is recovered as the abaca of commerce is contained chiefly in the outer surface of the petiole. The inner surface of the petiole and the portion between the two surfaces are made up, for the most part, of cellular matter, although they also contain much fibre of a lower tensile strength than that contained in the outer surface.

After the petiole has been removed from the plant stalk, preparatory to stripping by the hand process, ribbon-like strips are peeled from the entire length of its outer surface. Only these thin, fibrous ribbons are submitted to the hand-stripping process. All the remainder of the petiole is discarded. As

already pointed out, this discarded portion, while containing chiefly watery, cellular matter, also has much fibre that is valuable, though never recovered by the hand process of stripping. This cellular portion of the petiole, the discarded outer petioles and the cut ends of the stripped petioles make up the semi-fibrous waste of abaca.

The habitat of abaca is in southern Luzon; the Provinces of La Laguna, Cavite, Batangas, Albay, Ambos Camarines, and Sorsogon; Samar and Leyte and southern Mindanao, chiefly. A mill situated anywhere in the islands would require a more or less considerable haul for most of its supply of abaca waste. It would also have to solve the problem of collecting the waste in the various regions where it is produced. Undoubtedly this would be an easy matter. Once abaca growers knew that there was a market for the waste at a price to leave a reasonable margin of profit over the cost of baling and collecting, the waste would be taken care of as systematically as is now the case with cordage fibre. In fact, a considerable amount of this material has been collected and exported from the Philippines at different times.

The semi-fibrous abaca waste owing to the length of time, the pressure and the strength of caustic soda required to remove the cellulose matter, cannot be used profitably in the manufacture of the better grades of paper. But this material might readily be manufactured into wrapping paper of the sort in which strength and cheapness are of more importance than colour, by the process employed in working up jute—that is, by the use of lime, cooking under pressure, and partial bleaching.

Grasses.—Grasses of several varieties have long been in use for the manufacture of paper stock. Perhaps the most widely known of these is the esparto grass (*Stipa Tenacissima*), for many years an article of commerce in the Mediterranean countries.

This grass has been employed in some of the mills of Europe for many years. In India, the Bhabar grass (*Ischaemum angustifolium*), which yields a paper but little inferior to that of esparto, is very generally in use. The Munj grass (*Saccharum sara*) and several other grasses of the same species are constantly used. The paper industry of India is founded principally on these grasses and has become very extensive.

Mr. Richmond experimented with two Philippine grasses, cogon (*Imperata exaltata* Brong), and Talahib (*Saccharum spontaneum*), and found each to be an important source of paper stock. Cogon grass grows from two to four feet in height, and is found in even stands on open lands, foot hills, and low mountains in almost every part of the Philippines. It is broad-leaved, gregarious, and thrives with but little moisture on almost any sort of land. In many sections of the Islands, where nipa is not to be had, the natives rely on cogon grass roofing and siding for their houses.

Cogon grass is found in abundance in the central plain of Luzon on most of the open land. In the Province of Tarlac, between Capas and Concepcion, there is a good stand of cogon grass covering a level area of abandoned rice and sugar land. The grass on this area is usually of good stand and quality. Throughout Tarlac Province and, to a less extent, in the adjoining provinces, there are large areas of open land covered with cogon grass of good quality. Cogon grass is also abundant in the Visayan Islands.

Cogon grass is not jointed. This quality is regarded as of great advantage in the matter of making paper pulp. Its yield is from 5 to 10 per cent more than that of cereal straws, and it is more easily pulped with a smaller proportion of caustic soda. It has the further advantage over cereal straws that it can be harvested just before it is ripe, a period when it gives the best results. Cogon is easily prepared for digestion, and

requires no preliminary cutting down after being dried, hand-picked, or machine cleaned.

Talahib (*Saccharum spontaneum*) is a coarse jointed grass growing from six to ten feet tall. It is gregarious, and springs in tufts from stout underground root stalks. Talahib is often confounded with cogon grass. It is very different from the latter, however, in both its appearance and habits of growth. Talahib thrives best in low, moist land and flourishes in river vallies and areas subject to annual floods.

This grass generally occurs with or near cogon grass, growing vigorously in the wet places where cogon does not do so well, and being of a poor variety on the up lands where cogon thrives well. It is difficult to get rid of. Cutting and burning has but little effect on it other than to increase its yield and quality. Talahib is related to the *Saccharum sara* (the Munj grass of India) and *Saccharum officinarum* (the sugar-cane of tropical countries).

An experiment carried out by Mr. Richmond with a small quantity of talahib, fully matured with entire stems and leaves, gave as result a percentage of 53.9 of cellulose.

Bananas and Plantains.—Plantains (*Musa paradisiaca*) and bananas (*Musa sapientum*) contain much fibre that might be utilised in the manufacture of paper stock. These plants abound almost everywhere in the Philippines. Probably close to 100,000 acres are planted to them. The fibre from them has not the tensile strength of abaca, but this is considered by Mr. Richmond an advantage when the fibre is to be employed in the manufacture of paper pulp. Nearly 20,000,000 bunches of fruit are gathered yearly in the Islands from these plants, and there are, therefore, a like number of full-grown stalks which annually go to waste, since practically no use is now made of them. The figures do not include the wild non-edible plantains, which are common

throughout the Philippines and which might be utilised in the making of paper stock.

The chemical investigation of plantain fibre carried out at the Bureau of Science showed a percentage of 68.21 of cellulose. There appears to be no good reason why a plantation of bananas might not yield a profitable revenue from its fruit, and at the same time supply a pulp mill with the stacks discarded when the fruit is harvested. At the present time no bananas are exported from the Philippines; nor is the domestic market as well supplied as it should be, considering how valuable the fruit is as an article of diet.

Maguey Waste.—Maguey (*Agave cantala*) and sisal are being extensively planted in several sections of the Philippines. These plants yield a fibre that is well known to the cordage world. This fibre is extracted by retting at present, but a moment is on foot to revolutionise the methods of recovering it by the introduction of machines. When maguey and sisal fibre is extracted by machinery there is a considerable quantity of waste that is comparable to abaca waste. The maguey, owing to the nature of the leaf of the plant, is considerably more bulky than abaca waste.

Other Materials.—Bowstring hemp (*Sanseveria zeylanica*) is found in many parts of the Archipelago. It is not, however, of commercial importance. It has possibilities and might be cultivated for its fibre, which is not unlike that of maguey.

Coconut coir (husk fibre) might be produced in abundance in all the coconut regions. At the present time this by-product of the coconut industry is almost entirely neglected. It might be utilised very profitably in the manufacture of paper.

The leafstalks of the nipa palm contain valuable paper substance. At present little or no use is made of these, though a vast amount of the nipa leaf is used in almost

every section of the islands for thatch and siding for houses.

The buri palm is widely used in the manufacture of hats and other handicraft products, and yields an immense amount of waste in the process of extracting the material utilised for these purposes. No small part of this waste might be employed in the making of paper stock.

The milling waste of certain soft Philippine woods is known to be valuable as a source of paper stock. Mr. Richmond made successful experiments with lauan, kupang, and similar varieties.

It is not conceivable that any of the minor sources of paper pulp mentioned above would alone yield enough material to keep a mill in operation, but, nevertheless, they are not altogether negligible at a time when the world appears to be facing a shortage of such substances.

Raw Materials for Paper-Making Chemicals.—It is the opinion of the Director of the Bureau of Science that caustic soda, sodium sulphite and the bleaching powder required in the manufacture of paper could be manufactured in the Philippines if there were a demand for them. At present all such chemicals are imported.

An international exhibition will be held in the spring of next year, under official auspices, at Ghent, of architecture and building and subsidiary industries. The object of this exhibition is stated to be the desire to give an impetus to reconstruction in the devastated areas.

THE MURRUMBIDGEE IRRIGATION SCHEME IN AUSTRALIA.

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WHILE enjoying a short holiday in Australia I have taken the opportunity of becoming more acquainted with the unique Murrumbidgee Irrigation Scheme, and knowing how very important irrigation is to the prosperity of India I wish to tell you something of this undertaking through the kindness of the Editor and in the pages of the valuable *Mysore Economic Journal*.

THE SCHEME.

The scheme is located in the State of New South Wales on the Murrumbidgee River at a distance of 353 miles from Sydney. The total area watered at present is not less than 70,000 acres, but eventually the plans call for a total watered area of 200,000 acres. The plan of the scheme in bare outline is quite simple—there is a huge concrete Dam uniting two hills which makes possible the storing of water for a great many miles back; that water is distributed to farms over a large area by means of canals and channels.

The engineering work of the scheme may be divided under three main headings, namely:—

1. Burrinjuck Dam, and works incidental thereto.
2. Berembed Diversions Weir, Main canal, and Main Branch canals, with structures therein.
3. Supply and Drainage channels, Roads and other works necessary for the development of the irrigated farms.

The scheme was constructed by the State Government for the purpose of settling people on the land free from drought conditions,

and is now administered by a Water Conservation and Irrigation Commission. It has proved a great success.

A brief 'resume' of the history of the Murrumbidgee Irrigation Scheme may be interesting. The first proposals for irrigation in the State of New South Wales took tangible form as the result of the Royal Commission on water conservation that concluded its deliberations in 1884. This Commission amongst other proposals, suggested the construction of canals from the Murrumbidgee River to supply water for irrigation to the lands lying in the arid zone of its lower valley. Twenty years later powers were provided by Parliament for the construction of a canal on the north side of the Murrumbidgee, to serve the first great irrigation project to be carried out in New South Wales.

This worked well for some years, but later it was seen that a much larger supply must be forthcoming. This necessitated the construction of a huge dam for the purpose of storing a large quantity of water, which forms the chief feature of the present scheme.

The catchment area above the site of the dam is about 5,000 square miles with an average rainfall according to position of from 18 inches to 63 inches per annum. The site of the dam is an admirable one for purposes of storage. On either side the hills rise steeply to a height of about 2,000 feet above the full supply level. At about one mile above the Dam the gorge opens out into a large basin, which formerly included the junction of two rivers. When the Dam is full the area of this portion of the storage will be about 3,500 acres, with a depth of water over a large portion of from 130 feet to 150 feet. Above this basin, the rivers again enter the hills, opening out into smaller areas of submerged flats here and there, which afford considerable additions to the storage. Some 13 miles above the Dam the Yass River joins the Murrumbidgee, water will be eventually held up the Yass River to

22 miles, up the Goodradigbee River to 15 miles, and up the Murrumbidgee River to 41 miles Above the Dam. The total capacity of the Dam is estimated at 33,612,671,000 cubic feet, or 771,641 acre feet.

In point of view of storage the Burrinjuck Dam of this Murrumbidgee Scheme ranks fourth among the great dams of the world, as will be seen from the following table:—

Name of Dam	Capacity in acre feet	Volume of concrete in wall (Cub. Yds.)
Elephant (U. S. A.)..	2,600,000	500,000
Assovan (Egypt) ...	1,865,000	1,179,000
Roosevelt (U.S.A.)...	1,279,362	342,500
Burrinjuck (Australia)	771,641	374,000

The Burrinjuck Dam has a maximum height of 240 feet with a base of 160 feet thick, tapering to 18 feet at the top.

I need not go into details about the Diversion weir, the main canal, the distributing channels, the roads and other works necessary for the development of the irrigated farms. Suffice it to say that the scheme has been a great engineering triumph, people are going in large numbers to an area where a sufficient water supply is assured to them and drought and famine are unknown, and a dry, formerly uncultivated district has been transformed into a veritable Garden of Eden.

THE FARMS AND FARMERS.

From time to time farms are made available varying from 2 acres to about 250 acres. Included in these areas are blocks intended for residential purposes, fruit growing and dairying. Each farm has a definite number of water rights attached to it. The tenure is perpetual leasehold. Rents vary from 7 shillings to 25 shillings (Rs. 3—8 to 12—8) per acre depending upon the quality of the soil and the use and position of the land. Any male person not less than 16 years of age, or female not less than 18 years, it not subject to any special statutory disqualification, is eligible to apply for land on the Irrigation areas, or acquire

same by way of transfer from a private person. A condition of residence is attached to each block. The whole purpose of the undertaking is not to make money on the part of the Government, but to establish people on the land on most advantageous terms for the development of the country and the good of all.

The range of products is very interesting: The results obtained at the Yanco Government Experiment Farm (which has been established for about 10 years) have demonstrated in the most practical manner, that, with irrigation, the soils and the climate are capable of producing profitable crops of peaches, apricots, nectarines, prunes, plums, pears, apples (certain varieties), almonds, melons, cantaloupes, and citrus fruits; also wine and table grapes, raisins, sultanas, currants, figs, and olives. All of these thrive under irrigation in this region; the quality of the fruit being equal to anything to be obtained on the Australian market.

Parts of the areas are adopted for the production of lucerne (alfalfa). There are other fodder crops also which do well on these soils: wheat, oats, barley, sorghum, maize, millets, and other cereals and grasses.

In addition to these products there are great opportunities on these irrigated areas for the dairyman. It is expected that the predominant industries will continue to be dairying and fruit-growing. For these the conditions are excellent. With fodder crops of the most profitable kind, to supplement the natural pastures, aided by conditions of climate, and what may in addition be done by man, dairy cattle may be made to give the best possible returns. Butter of the highest quality is produced there.

The Commission's Butter Factory at Leeton, the township for the Yanco Irrigation area, is one of the finest in Australia, being spacious and appointed with all the most modern details of plant and having a capacity for the expeditious handling of the milk and cream of 10,000 cows. The factory takes all the cream produced, and cash is paid for it monthly, thus ensuring for the farmer an immediate and regular return for his industry.

The Government assures to the settlers a ready market for all their products. The pig-raiser's industry has become a very important adjunct in the development of the scheme, particularly as a bacon factory has been erected to handle the output of the areas. At this factory as an instance of a ready market the Government purchases the pigs outright from the farmers.

Vegetables can be made to provide the settler with a source of revenue during the early years of the development of his farm. This particularly applies to such crops as peas, beans, and tomatoes. A second canning factory, one of the largest in Australia, has recently been established at Leeton. These factories treat both fruit and vegetables.

Every assistance is given to settlers by the Commission, such as—advances in money, or the equivalent in materials, trees, or seed; fruit trees and vines may be purchased from the Commission's nursery. Assistance is also rendered in the purchase of dairy stock; brood sows and boars are supplied on terms; and horses and even pedigree bulls may be obtained from the Commission. Experts in dairying, fruit growing, and other branches of farming, also irrigation, are employed to advise settlers free of cost in up-to-date methods.

This briefly is the story of the great Murrumbidgee Irrigation Scheme, in which a wise Government offers liberal and practical assistance to settlers on easy terms. Special conditions and assistance are promised to returned soldiers. The advantage of this water scheme are worth noting.

The whole scheme has been created and is administered by the State Government, and the products are carried to markets on Government owned railways.

Experts are always available, to advise settlers free of cost regarding agriculture and irrigation. The climate of the Murrumbidgee Irrigation areas is dry and healthy. Farmers may engage in orcharding, dairying, pig farming, general farming, vegetable growing, viticultural work, stock raising, poultry farming, and bee keeping.

The Government has built the great Burrinjuck Dam, created extensive irrigated areas, and now the people may select and cultivate a farm where drought and famine are unknown and where good markets are assured.

ARTIFICIAL SILK INDUSTRY IN FRANCE.*

THE relative scarcity and high prices of silk and other textiles are at the bottom of a renewed interest that is being taken at present in the manufacture of the chemically-produced textile material known as artificial silk.

It was without any idea of filling a world demand that in 1855 Audemars, at Lausanne, Switzerland, took out his patent on a vegetable fibre for use in incandescent lamps. In 1884 the Count of Chardonnet discovered the collodion thread which he aspired to place alongside of silk in the textile world. But not until 1895 was it possible for the company which he founded to put on the market a thread which was denitrated and consequently less inflammable. Up to 1903 the new industry, interesting though it was, was not seriously regarded in the industrial world, but rather was considered in the light of an interesting novelty. In that year, however, the Societe de la Viscose put on the market the artificial silk which until recently has been the last word in artificial textiles. It may be noted that this company is, in fact, a monopoly and controls the European market very effectively, selling or withholding its goods as it sees fit; only now has the widespread demand for chemical textiles encouraged lesser companies to undertake the manufacture of artificial silks.

On account of the substance which it employs (wood), the new industry has been enabled to adapt itself to any climate. Favoured by groups of Lyon merchants engaged in the French silk and textile industries, who did not hesitate to support the infant enterprise, it has become widely spread throughout the civilised world.

*With acknowledgments to the *Journal of the Society of Arts*.

The production of artificial silk, which in 1902 was 2,000,000 kilos (4,408,000 pounds), rose successively to 5,000,000 kilos (11,020,000 pounds) in 1906, to 6,000,000 kilos (13,224,000 pounds) in 1912, and to 8,000,000 kilos (17,632,000 pounds) in 1914. Germany's production of this article is estimated at 5,000 kilos (11,020 pounds) daily; and France, when the new installations of machinery are completed and material more easily obtainable, will be capable of putting out some 4,000 kilos (8,816 pounds) per day. As in other French manufactures, the lack of fuel and the embarrassed transportation services are more serious obstacles than any lack of raw material. While it is impossible to estimate with exactness the total production for 1919, it was assuredly great, but far below the demand.

Progress was checked by the war, while at the same time the demand for the products of the industry was greatly augmented on account of the paucity of all textiles. In spite of the fact that viscose silk is extremely inflammable and cannot resist humidity, uses for it were numerous, during the war, to replace other materials; and it was even found possible to make use of it directly in war work. At Lyons, a cellulose-textile factory, serving as a plant for producing explosives, made sacks of artificial silk to hold powder; and certain parts of the anti-asphyxiation masks used on the front were also made of this cloth.

It is worth noting that the increasing activity of the artificial-textile industry, far from coming into competition with that of the natural silk, coincides with and supplements the growth of the latter. The production of natural silk increased from 19,000,000 kilos (41,876,000 pounds) in 1904 to 23,000,000 kilos (50,692,000 pounds) in 1906, to 27,000,000 kilos (59,508,000 pounds) in 1912, and only dropped to 22,000,000 kilos (48,488,000 pounds) in 1914 because of the war. The difficulty experienced by natural-silk weavers in procuring sufficient material,

and the top prices it commands, provide abundant proof that natural silk is more than ever in demand and has nothing to fear from what, at most, is a distant competitor. Viscose silk cannot be obtained in the really fine grades; its use is restricted, for the most part, to such uses as do not subject it to fire and water. In short, taking into consideration that natural silks cannot supply the market, the artificial silk supplements the natural product, but does not compete with it except in the lower grades.

According to a report prepared at the United States Consulate at Lyons, a renewed impetus was recently given to the use of chemical textiles by the invention of an entirely new process, the product of which is called silk cellulose. This new form of cloth is claimed to possess a brilliancy comparable to silk, a remarkable solidity and durability, a touch similar to silk, and absolute imperviousness to water; at the same time it is no more endangered by fire than the ordinary natural silks. While the thread of the viscose silks is, of necessity, relatively coarse and thick, the new silk permits of making threads of considerable fineness, and is particularly remarkable for the quality of the velvets which can be made from it. The new process differs radically from the old processes. Instead of converting a thick liquid (the viscose) into thread, it appears that it is possible to preserve the wood fibres and convert them into a brilliant and solid cellulose. As a result of this there is obtained a greater molecular concentration and a regular geometric form in the elements that make up the thread; all of which, it is claimed, greatly increases the strength and durability of the cloth.

A large factory for the production of the new textile is being projected for large-scale commercial production in the Lyons district, where such materials as velvets, jerseys, satins, draperies, linings, and other silk goods will be woven. Although artificial silks can already be obtained at very advantageously

prices as compared with natural silk, the inventor of the new process claims that his product will be able to reduce still further the cost of chemically-produced threads.

Despite the fact for years to come the artificial textile may not compete with natural silk, yet the producers of the latter must eventually look for advances and inventions on the part of chemists that may ultimately remove the defects now so obvious in the viscose silks. What is most needed is ability to spin a much finer thread, which is at present extremely difficult an account of the air which is held in the coagulating bath in which the artificial threads are formed. Seven or eight years hence, when there has been time for a surplus of artificial silk to accumulate on the market, by reason of the establishment of new plants and increased production of other textiles, those whose interests are bound up in the artificial silk industry will be forced to bring about new developments in order to enable it to hold its place; at that time real competition may be looked for between natural and artificial silks.

The following data have been made public as technical means for determining the various sorts of artificial silks:—Sulphuric acid glycerinated: pure glycerine, 10 cubic centimetres; distilled water, 5 cubic centimetres; concentrated sulphuric acid, 15 cubic centimetres. Iodo-ioduret of potassium: iodide of potassium, 0.3 gramme; water, 30 cubic centimetres; iodine in excess. Chloroioduret of zinc: chloride of zinc, melted, 1.75 grammes; water, 30 cubic centimetres; iodine to saturation. Concentrated sulphuric acid; chromic acid, half saturated; solution of caustic potash at 40 per cent; ammoniacal copper oxide: ammoniacal nickel oxide; a glycerinated and alkaline solution of copper. An acid solution of diphenylamine, 1.57 grammes; concentrated sulphuric acid, 25 cubic centimetres.

The ammoniacal preparation of copper oxide is prepared by dissolving the copper

oxide in ammonia in saturation, then passing through the solution a current of air from which the moisture has been removed by passing through a solution of caustic potash.

The ammoniacal solution of nickel oxide is prepared by dissolving 2 grammes of nickel sulphate (crystallised) in 30 grammes of water, precipitating the nickel by means of caustic soda, filtering, and then redissolving the precipitate in ammonia. The alkaline and glycerinated solution of copper is prepared by dissolving 3 grammes of copper sulphate in 30 cubic centimetres of water, with 1.75 grammes of pure glycerine, then adding enough caustic potash to precipitate the copper and redissolving.

There are five kinds of artificial silk: Nitrated silks, collodion silks, the viscose silks, the acetate silks, and gelatine silks.

In calcinating a fragment of the silk in a small test tube, in the upper part of which has been placed a piece of red litmus-paper, the calcination, in the event of the silk being of the gelatine variety, will produce ammonia vapours which will turn the paper blue. There should be, further, the familiar odour of burnt horn. When calcinated, the four other kinds of silks emit vapours which turn the blue paper red.

The silk of the acetate variety, when treated with glycerinated sulphuric acid, takes on a yellow colour with iodo-ioduret of potassium and also with the chloro-ioduret of zinc.

The silks of nitrocellulose, of the viscose silks, dissolve rapidly in sulphuric acid concentrated cold; the cellulose silks dissolve slowly. All three dissolve little by little in cold chromic acid, and rapidly if the acid be heated. The three, and the acetate silks as well, swell up in a solution of caustic potash; while in the same solution the gelatine silk dissolves rapidly and completely.

In the ammoniacal solution of copper oxide, the collodion and viscose silks begin by slowly swelling and then dissolving; while

the acetate silks swell without dissolving, and the gelatine silk turns a bluish violet and does not dissolve.

With ammoniacal oxide of nickel the artificial silks swell without dissolving, except that the gelatine silk turns brown without dissolution or swelling.

The glycerinated and alkaline solution of copper does not have any effect on the artificial silks even after a prolonged boiling, excepting upon the gelatine silks, which are rapidly dissolved.

The solution of diphenylamine gives a pure blue colouration to the nitrocellulose silks alone; the colouration is most intense at the end of five minutes and fades little by little thereafter.

Care should, of course, be taken to make tests at the same time with silks of known varieties for purposes of checking and comparison. Should the silks have been dyed, the colour should be taken out with hydro-sulphite.

An important trade mission, including not only cotton-spinners, manufacturers and merchants but also representatives of the trade unions concerned, will be sent from Lancashire to India and the Far East in October, to inquire into the prospects of exports of cotton goods. The cost of the mission will be about £18,000, and the Treasury has offered to contribute £3,000 if the remainder of the money can be found in Lancashire. The cotton control board which when its work came to an end at the close of the war held funds to the extent of about a million sterling, is likely to complete the amount required. The project is stated to have the support of Mr. Ainscough, the senior Trade Commissioner for India and is likely to be followed by other missions of a kindred character.

ON THE DUTIES OF CO-OPERATORS.

BY K. H. RAMAYYA, B.A., BAR-AT-LAW.

THE theory of co-operation is said to be that an isolated and helpless individual can develop himself to the fullest extent of his natural abilities by associating with others and by moral development and mutual support gaining all the advantages which are held by wealthy and powerful individuals. The chief object of the introduction of Co-operation in India was to bring relief to the masses who were steeped in ignorance, poverty and superstition. It was found that the economic condition of the peasants showed no improvement in spite of the rapid growth of commerce and railway and other communications, that agricultural methods had not improved and that usury was rampant in villages. The rural classes as a whole were conservative with no desire for education or advancement due to a resigned acceptance of existing conditions and to absence of ideals for the future. To such a stagnant Indian society, co-operation came as a boon. But, though Co-operative Societies have been flourishing well in India, and more so in Mysore, very few people have understood that the Co-operative movement as a whole is essentially a moral one and that it is individualistic rather than socialistic. The mere starting and working of Co-operative Societies do not bring about the amelioration of the masses, if they forget to recognise the moral aspect of the question and if the members thereof are quite ignorant of the true principles of co-operation.

The first duty, therefore, of co-operators is to understand the main principles. I quote here for your information some of the principles recorded in the Report of the Committee of Co-operation in India *viz* :—

- “(1) That the object of co-operation is as much to encourage savings as to grant loans on reasonable terms,

- (2) that the success of the Societies depends on the mutual knowledge of the members and the exclusion of bad characters,
- (3) that the liability of the members is joint and unlimited,
- (4) that loans must be properly used for the objects for which they are sanctioned,
- (5) that the repayments must be punctual and genuine,
- (6) that the powers of control vested in the general meeting should be known to the members, and
- (7) that the sources of funds and the constitution of the central financing agency as well as its relation to the society should also be understood by them."

The express object of a Co-operative Society being the development of thrift among its members it should be very careful in selecting as its members honest men who intend to benefit themselves and at the same time afford facilities for the benefit of others. The loans granted by the Society must, therefore, be in no circumstances for speculative purposes, but, on the other hand, care should be taken to see that the loans are as far as possible used for genuine productive purposes. As Co-operative Societies are training grounds for our practising the art of self-government, it is the duty of every co-operator to see that there is always danger in excessive exclusiveness and that no deserving but poor persons are excluded on the ground of their caste or status. In fact, all the members of a Co-operative Society should feel as members of a large family possessing mutual rights and duties.

It is not enough that societies are merely *Co-operative*, they must also be *business-like*. The Board of management must consist of experienced men of different walks of life, who are willing to give their services to it gratuitously. The ultimate authority must not be given over to the office-bearers, however able and experienced, but it must rest in the hands of the members who must always take practical interest in the business of the Society. Every member must feel it his duty to attend the meetings regularly and effort must be made to be as far as possible punctual in attendance. As a matter of duty, every member who for one reason or another is unable to attend the meeting must make it a point to write a letter to the Secretary not

only to make him aware of his inability to attend the meeting but also as a matter of courtesy not to make the other members unnecessarily wait for him. If this simple rule is followed by the members, much business could be transacted without waste of time and without adjourning meetings for want of quorums as is usual in the case of many of our meetings. It is also good to observe punctuality in the case of repayments of loans as they fall due. As the constitution of the Societies is truly republican, each member having one vote and no more in the general meeting, each member should play his part freely and well. Whenever loans are given, the committee and members should keep a vigilant watch and see that the money is expended for the purpose for which it is granted. The office-bearers should also see that proper accounts are maintained by the clerical staff and that they are now and then checked by competent auditors.

As much of the executive work of a Society falls on the Secretary, it is the duty of the members to see that a capable and earnest worker of broad sympathies should be chosen for the post. When once he is chosen for the responsible office, he should be given every latitude to do his onerous work unhampered by unnecessary and useless criticisms. If, after having been given a full opportunity, the Secretary is found to be incompetent or undesirable, he should be removed quickly and a competent man appointed in his stead.

In matters of business, sentiment should not be allowed to play any part.

It should be the constant aim of every co-operator to see that no benevolent institution of any kind, such as, schools, hospitals, etc., in his locality die for want of support. Above all, it is his duty to stamp out ignorance, poverty, disease, etc., from the place where he happens to reside. For this reason, he should endeavour to start primary schools, co-operative societies, improve sanitation, and encourage the growth of industries.

Lastly, he should try to take note of the man-power and the womanpower existing in his locality irrespective of caste, colour or creed and try to create opportunities for them to develop to the fullest extent possible so as to enable new, healthy, and prosperous conditions to come into being in the place in which he happens to reside and carry on his business.

BRITISH EMPIRE FORESTRY CONFERENCE.

[The resolutions passed at the British Empire Forestry Conference held in London in July last, and attended by upwards of forty delegates representing respectively the United Kingdom, Australia, Canada, India, Newfoundland, New Zealand, South Africa, the Crown Colonies, Egypt and the Sudan, have been issued as a White Paper, and are to be brought to the notice of the various Governments. The following are the main points:—Ed., M. E. J.]

In view of the great importance to the Empire as a whole, as well as to each of its component parts, of producing a sustained yield of all classes of timber, and of encouraging the most economical utilization of timber and other forest products, and of maintaining and improving climatic conditions in the interests of agriculture and water supply, the Conference affirms that each of the Governments of the Empire should lay down a definite forest policy to be administered by a properly constituted and adequate forest service.

The foundation of a stable forest policy for the Empire and for its component parts must be the collection, co-ordination, and dissemination of facts as to the existing state of the forests, and the current and prospective demands on them.

In order to attain continuity in the development of forest resources, it is desirable that certain elements of stability be secured in the constitution of the forest policy. This may be done by the following measures:—

1. The definition, where this has not been done already, of forest policy in a Forestry Act or Ordinance.
2. The reservation for the purpose of economic management and development of forest land under conditions which prevent the

alienation of any which is primarily suitable for forests, except for reasons consistent with the maintenance of the forest policy as a whole.

3. The assurance to the Forest Authority of funds sufficient to carry out the accepted policy for a series of years.
4. The grant to members of the forestry service of the status of civil servants with due provision for pension.
5. The appointment as the chief officers of the forestry service of persons having a high standard of training in forestry, their selection and promotion being by merit alone.
6. The establishment in each of the larger parts of the Empire, and for the Colonies not possessing responsible government collectively, of an officer, or officers, having special duties of advising as to forest policy and surveying its execution.

It is extremely desirable that the Forest Authority should be in close touch and consultation with organizations representing the interests concerned in the extraction and utilization of timber and other forest products.

The Conference have had their attention drawn to the advantages which have accrued in several parts of the Empire from the wide distribution of forest plants, and desire to bring the method of encouraging tree-planting by distribution of plants, either from Government or private nurseries, gratuitously or at cost price to the earnest attention of their Governments.

A scheme of research work received the approval of the Conference, and is recommended to their Governments for early consideration and approval. This takes the form of a report from a Committee dealing with

the organization and sub-division of research with the relation of the different parts of research to one another and to education and practice, and with the subjects of research both generally and in relation to the needs of the different parts of the Empire.

It should, the Conference declares, be a primary duty of Forest Authorities throughout the Empire to establish systematic schemes of forestry education. It has been found, for climatic and other reasons, that it would not be possible for each part of the Empire to establish a complete scheme of forestry education of its own, and, therefore, it is essential that those parts of the Empire which are willing and able to establish complete systems should, as far as possible, frame such schemes with a view to combining for meeting the needs of those parts which can only themselves make a partial provision for their requirements.

Part of this subject has been dealt with by another Committee, whose report embodies the following principles:—

1. That one institution for training forest officers be established in the United Kingdom.
2. That students be selected from graduates having taken honours in pure or natural science at any recognized University.
3. That it be an integral part of the work of the institution to arrange supplementary courses at suitable centres for students requiring special qualifications, and also special courses for forest officers from any part of the Empire, whether at the institution itself or at centres of training in other parts of the world. The Governments should recognise these courses as part of the ordinary duties of the forest officer, at any time during their service, and the Governments concerned should give special facilities to forest

officers in their service to attend such courses.

4. That a department of Research into the formation, tending and protection of forests, be associated with the training institution.
5. Encouragement should be given to the existing provision made by Universities and Colleges for forestry instruction for those who do not desire to take the full course suggested for the forestry service. It appears that this is especially applicable to the United Kingdom.

It is also desirable to make adequate provision for woodmen's schools for the training of foresters as distinct from those which are intended for forest officers.

The Conference also approved of the suggestions and recommendations for the constitution of an Imperial Forestry Bureau which are contained in the report of a committee. The delegates feel that it must be upon the work of such a Bureau that the proper development of the forestry resources of the Empire will largely depend, and they therefore, cannot over-emphasise its importance as a part of Empire organization. The following questions should be referred to the Bureau immediately on its formation:—(i) Standardisation of forest terminology; (ii) correct identification of timbers, and standardisation of their trade names. The total sum required will not be less than £10,000 per annum during the first five years of the Bureau's existence. It is proposed that the different Governments shall contribute on the following basis: United Kingdom, 25 per cent of the annual expense; British India, 25 per cent; Self-Governing Dominions, 25 per cent; Crown Colonies and Protectorates, 25 per cent.

The delegates recommend that the next Conference be held in the year 1923, and that, if the Dominion Government approves it be convened in Canada.

WEST COAST INDUSTRIES.

BY S. R. RAO.

THE passage recently through the Imperial Legislature of a measure validating the transfer of what used to be known as the Basel Mission Industries to a quasi-philanthropic body known as the Commonwealth Trust Limited draws attention to the very great possibilities of Indian industrial development under the direction of well-managed philanthropic societies—or alternatively under properly conceived system of State aid and direction. Both methods have been worked successfully on the west coast, the former in the case of the tile-making and weaving industries, and the latter in the Government fish and soap factories, the work of all of which industries is of the greatest importance alike from an educational and an economic point of view. Hardly any part of India is as highly favoured in the matter of economic resources as the West Coast, particularly the districts of North and South Malabar and portions of South Canara, but with a few exceptions, notably in the case of the planting districts and the work already noted of the Basel Mission, little has been done till comparatively recently to tap these resources. The latter work originated as long ago as when a printing press was started, with the twofold object of providing work for the converts of the Mission and of publishing in the vernaculars the gospels and other christian literature. That press we may say in passing is now one of the most up-to-date and best-equipped in the Southern province. From this small beginning grew other industrial ventures, notable among which are the tile-making factories amongst the best of their kind in South India. The tile industry was started in 1865 on a small scale, with a hand-press, and later in 1881, steam power was introduced with a great increase in out-put. The tile made at the Mission factories are

of high quality and are supplied to the Government Public Works department. At first only flat roofing-tiles were made, but now at the Jeppoo factory ridge-tiles, both plain and ornamental, sky lights and ventilators, ceiling tiles, flour-tiles, etc., are made. The daily output of the various factories is now as much as 60,000 and their market includes Ceylon, East Africa, the Persian Gulf, the Strait Settlements, Borneo and even Australia. Hardly less important than the tile-making industry started by the Mission is their weaving establishment, famous throughout India for its "calicut checks." It is interesting to note, *en passant* that it was here that the dye now known as *khaki* originated having been discovered by a Mr. Haller, a Missionary associated with the dyeing department of the Mission, and recommended for use by the British Army by Lord Roberts when on a visit to Mangalore. The industry has now been considerably developed and employs over 1,500 workers. In the case of this industry as of the tile-making industry an important result has been that the success of the mission ventures has resulted in the starting of a number of private factories, some of them eminently successful—a result perhaps even more important than the success of the original venture, since it shows that Indian enterprise is not slow to respond to the stimulus given to it by a successful pioneer industry. Other departments of the Mission's work include a large mechanical engineering establishment and a carpentry department, both of which are doing very good work, and incidentally providing a field for the training in arts and crafts of the people around. After the outbreak of the war, the Mission industries which were largely under enemy alien control seemed in eminent danger of extinction but it has been found possible to continue their work in spite of the vicissitudes through which they have passed, and now under the control of the Commonwealth Trust Board, a quasi-philanthropic body with an eminently sound

direction, they have a great future before them, and are capable of infinite expansion.

So much for the work of the Basel Industries. Having seen what may be accomplished by a quasi-philanthropic body, we may turn to see what can be done by properly regulated state-aid. The work of the Fisheries Department in pioneering the fish-oil and guano industry, which promises in the future to be an industrial asset of the greatest importance to the West Coast is a great achievement. The Department was originally started with the object of teaching new and sanitary methods of fish-curing and generally demonstrating to the fisher population on the west coast the best way of utilising their great natural resources in this field. The fish-curing work still remains an important feature of the department's activities, and from it indeed has sprung an important canning industry, which has incalculably great possibilities before it; but the manufacture of fish-oil and guano is even more important. Sardines in their season are so plentiful on the West Coast that they used it in the past *as natural* manure. The presses of the department now extract a valuable industrial oil from these fish and use the residue as guano—a manure greatly in demand not only on the plantations of the West Coast, but much further afield. For both the oil and the guano there is an almost unlimited demand, and the success of the Government venture is proved by the fact that there have now sprung up all over the West Coast innumerable small private factories which are, we believe, doing very well from commercial point of view, though from their nature they are a great nuisance to the general public. A very important feature of the Department's activities in the West Coast is the educational work among the mopliah fisher folk, better to a crude and educated people, but who have now come greatly to appreciate the night schools, Co-operative Societies and other benevolent institutions started among them by the

officials of the Department. We have already alluded to the fish-cunnery started by the department. Not less important is the Soap-factory, which however is under the direct control of the Department of industries. Here vegetable soaps of all types are made, from the cheap bazaar product to high-class toilet soaps hardly distinguishable from the wares of Western perfumers but in all cases of guaranteed purity. Here again, if justification of the Government venture were needed, it would be found in the numerous private soap factories which have been started in the neighbourhood, many of which are already making excellent profits. We think we have written enough on the foregoing lines to show that on the West Coast at any rate it has been abundantly proved that private enterprise in India responds freely to the stimulus given by pioneer industrial work undertaken by Government or private philanthropic societies. A good deal more might be written of the good work of the Fisheries Department, for which great credit is due to Mr. Frederick Nicholson its eminent chief and founder and his able assistant Rao Bahadur K. N. Govindan, but our aim has been not to enter into a detailed study of the technique of the work, but to indicate the eminent success of the Departments' liberal policy.

The number of motor-cars imported into India during the four months, April to July, 1920, was 5,292, valued at Rs. 19,500,000 as against 1,474 valued at Rs. 4,100,000, in the corresponding period of 1919. Of these 5,292 cars, 4,015 were shown to have come from the United States, 616 from the United Kingdom, 510 from Canada, 35 from Italy and 10 from France. The country of origin of many cars shipped from the United States is, however, Canada. Bombay imported 1,983; Bengal 1,860; Madras, 710; Burma 396 and Karachi, 373.

EDUCATIONAL RECONSTRUCTION IN INDIA.*

BY C. R. NARAYANA RAO, M.A., L.T.

WE must state at once that the title of this little book is distinctly misleading. What we find in it is not any constructive scheme, but rather the hackneyed criticisms on the existing system together with somewhat cheap and impracticable proposals.

The Educational problems in India are reviewed in the five Essays which comprise the book. The principal defect of the system of present education is, according to the author, that it is controlled by the state and accordingly its "tendency has been to become progressively unreal, so that to-day it is a machinery which stunts our growth, a mass of unreality expressing no meaning and capable of expressing none, a system which tortures us by its elaboration and kills our mind and soul by its barrenness." We honestly doubt whether education really would have progressed in India to the extent it has to-day if it were left entirely under the popular control. Well, Education is one of the transferred subjects under the Reform Scheme and Nationalists politicians have a chance of establishing in India through their Indian Minister what they call "National Education"—whatever that may mean. What Indians want is neither "national" nor "State-ridden Education," but one which teaches them things that concerns them most *to do*. For the purpose of founding national schools and colleges, the author examines the claims of different languages, for the adoption of one of them as the common language of India. He concludes that Hindustani has the strongest claims in this direction,"—"the language which the ordinary man speaks in Northern India"—and this

is to replace English as the medium of instruction. This proposal, the author maintains, will not affect the vernaculars, and we suppose that it is applicable to women's education also. The Government of the country being British, English also in conceded a place in this scheme on a level with the vernaculars. Well then the position is this. A Dravidian or an Andhra boy has got to learn Hindustani his first language, then English and his own particular vernacular together with such other subjects as the National School will instruct. Without National Schools, he had to do two languages and now three! The main objection to the use of English as the medium of instruction is that it is a foreign tongue whose understanding entails considerable loss of time and mental energy and after all the mastery is only very imperfect. All this argument may be hurled against Hindustani and even the vernaculars. The Indian youth at college understands his English text-books far more easily and readily than his Vernacular books which have been written in a language and style quite foreign to the mind of the average student. Assuming that we succeed in mastering the vernaculars of our text-books, can we impart instruction in the Western sciences and philosophy through our Vernaculars. Assuming too that we succeed in translating the scientific books in our vernaculars, can a student trained in this fashion participate in research or applied work of any importance, can he follow the methods of work in Europe or influence them to any extent through his vernaculars. The case of Japan is cited in this connection. The Scientific literature of Japan to which we have access is all in the European languages and the Journal of the College of Science, Tokyo, will bear out what we say. We are not, however, to be understood as being hostile to the proposal of the adoption of vernaculars as a medium of instruction in our schools. In fact this is being tried with mixed results in our Anglo-Vernacular Lower Secondary Schools in the State and they by no means justify the whole sale use of vernaculars in our colleges and universities.

We are one with the author in his criticisms against the universities in India they have made a fetish of the examinations but

* "Essays on Educational Reconstruction in India" by K. M. Panikkar, B.A. (Oxon). Ganesh & Co. Madras, 1920.

unfortunately we are not in a position to substitute any better test. It is true also that the universities have not hitherto provided research work, but we see that a change is coming over and already the output of work from our universities is becoming recognized. Many people in India may not agree with the author in his statement that a classical revival must be the very base of an educational reconstruction," but all will surely agree that Indian classics should be promoted in our universities and the Madras University has just begun to give increased attention to the ancient classics. The chapter on the training of children contains some pious instructions for the parents to whom they may not be new but are too expensive or out of his reach otherwise for adoption.

The trouble with Education in India is this. Our present classes have become much too large for efficient instruction. In the nature of things, it is impossible that all these students can be fitted for higher University work. Such an attempt is not made in any other part of the world. You have got to recognize, at some stage in the education of our youth, those fitted for higher academical work and others not. The former alone should proceed to the University and the latter to the Government offices, the industrial factories and work-shops, back to the land, to the army and the navy, to the banking and trade concerns, to the Railways, Telegraph and postal departments which require a certain amount of mental training to understand the departmental technique and in which a University degree with higher training in science or humanities would be sheer waste. The learned professions should be the proper field for our university graduates and the whole trouble, to our mind, well even the communal trouble, we mean, will disappear if equal opportunities are created for both these classes of men to become rich and influential in their own country. Wealth and power we contend for through University Education and if we can get both in an equal measure in ways other than a University degree, then there ought to be reasonable contentment and peace among the different communities. This problem is not beyond the reach of practical statesmanship, and if there is the real national problem we are certainly one with the author.

The book is written in a bright style but does not go to the root of the evil.

ECONOMICS IN THE WEST.

Industrial Conditions of the Hour.

London, 19th August, 1920.—There are many evidences that the boom in trade which set in after the Armistice is slackening. Short time is becoming the rule in not a few trades and there is growing unemployment in industries which a short time since were working at high pressure. It is possible that this depression is only a passing phenomenon due to purely temporary causes such as the shortage and high price of coal and other raw material, the temporary satisfaction of the most pressing of the world's needs for manufactured goods, and the erratic course of exchange which makes commercial transactions difficult. But it is idle to disguise the fact that the conditions of the world, and especially of the European world, at the present juncture are such as to offer no strong hope of a sustained and prosperous trade. Here at home at this moment we are beset with difficulties of the most menacing kind. The miners have put forth demands which if conceded will add an intolerable new burden to industry, and which if rejected will precipitate a strike which will paralyse the country's trade. At the same time there is proceeding what is to all intents and purposes a revolutionary movement with Bolshevik affinities calculated to test to the utmost the patience and strength of the nation and to divert it from the work of reconstruction if it does not produce any more serious consequences. So disturbing indeed, is the outlook that he must be an optimist of the most convinced type who can discern any favourable development offering in the industrial conditions of the hour. Nevertheless, we must not take too tragic a view of events, black and unpromising as they unquestionably are. A study of history teaches us that what we are experiencing to-day is the inevitable aftermath of a great

war in which the social and industrial fabric was shaken to its foundations. Just a century ago England was passing through just such a crisis as it is experiencing to-day. Then as now revolutionary ideas were rife and constitutional authority was flouted. "Direct action" which to-day takes the comparatively harmless form of setting up local committees in imitation of the Russian soviets a century since assumed the far more dangerous character of riotous combinations which broke up machinery and burnt ricks and destroyed crops. We weathered the storm then and I am convinced that we shall weather it again and probably date a new era of national prosperity from the existing upheaval as we did from the storm which swept the country after the Napoleonic wars. But the next few months are not going to be an easy time for any one and least of all for our manufacturers who are daily feeling the increased pressure of foreign competition.

As far as the miners are concerned the threat of a strike excites far less apprehension than a similar menace has ever done in recent times. In point of fact there is quite a considerable body of industrialists who would welcome rather than otherwise a trial of strength on the issue which the miners have raised. The feeling is that a collision is inevitable and that as it has to come it would be better to have it at once and settle once and for all whether the community is to be subjected to the veiled system of blackmail under which it has so long groaned. The effect of a stoppage of the mines would be far reaching and the financial loss would be colossal. But the belief is that the ultimate result of the conflict would be to create more stable conditions in industry generally by opening the eyes of the workers to the fact that they are and must be the first and worst sufferers from revolutionary movements whether in the form of general strike of miners or of a "direct action" movement by the Trade Unions. It is certain at all events that we have already reached the

extreme limit to which wages can be forced consistent with the maintenance of industry on anything like a profitable basis. The inflation of wage remuneration has been carried in some directions to quite ridiculous lengths. I was told the other day of a case in which in a large electrical manufacturing undertaking a man who merely fused wires—a quite elementary process—earned more money weekly than the engineer in charge of the entire business. There are men in the tinsplate trade who draw as much as twenty pounds a week and an instance was given not long since of a family in the cotton trade whose united emoluments reached £1,500 in a year. In extraordinary times such as those we have just passed through when the world was clamouring for manufactured goods and was prepared to pay almost any price for them high wages were no serious detriment to the country. But it requires no expert knowledge to understand that they cannot be continued indefinitely without limiting sales to an extent which in the long run must be ruinous to an industry.

THE MOTOR INDUSTRY.

The motor industry here is much perturbed at the action of the Ford Company in revising their scale of charges for cars on a basis intended to "cut" British prices. Coming as this procedure does at a time when home manufacturers are struggling with unexampled difficulties arising out of the increased cost of raw materials and an ever ascending wage sheet it has excited lively apprehension at the possibility of the industry competing successfully with the American cars. It is realised that the element of cost is a decisive one with a large class of buyers and that many orders which under other conditions would be placed at home will now go abroad. The satisfactory feature in the situation is the leverage which the superior efficiency of the British engine gives for obtaining business where price is not the only consideration which influences buyers. In these days of

excessively costly petrol economy in consumption is a highly important factor and in the long run it may outweigh the element of cost in the purchase of a car. Therefore, it is believed that though temporarily British cars may be placed at a disadvantage by the action of the Ford Company they will in the end assert their pre-eminence. For the better make of cars—the highly expensive productions which are acquired by those to whom money is no object the British manufacturer has a market which is peculiarly his own. The leading firms have more orders than they can deal with and the waiting lists are long. In connection with this demand for high grade cars I heard a day or two since a singular story which has the merit of being perfectly true. One of the new rich fraternity who have made fortunes by the war was especially anxious to obtain a Rolls Royce car of the highest grade. The manufacturers were unable to hold out any hope of even a moderately early delivery and sent him away disappointed. Chagrined at his failure he set to work to satisfy his needs in another way. Walking down Bond Street one day he saw a splendidly appointed Rolls Royce car draw up at one of the fashionable shops in that famous street. Approaching the owner driver of the car he asked him if he wanted to sell his car. The gentleman thus approached resented the question as an impertinence and with an emphatic “no” quickly entered the shop. On his return to the street a little while later the would-be purchaser again approached him and with an apology for his pertinacity said: “I particularly want a car: I will give you £7,000 for yours if you will sell it.” Taken aback at the character of the offer the owner hesitated and his interlocutor added: “You need not be afraid that I shall be unable to finance the transaction: if you will drive with me to ———’s (mentioning a famous bank) I will satisfy you as to my *bona fides* and if you desire it, pay you the money down.” The owner, who was not above making a heavy

profit on his original purchase, asked his questioner to enter the car and the two drove to the bank where the deal was finally carried through, the new owner driving away in the car in triumph. There are, of course, comparatively few people able to pay £7,000 for a motor car even in these times when, as the income tax statistics prove, the number who are liable to pay super tax is so much larger than it was before the war. But wealth and especially wealth of the new type was never more intent on having the best that the world offers in the way of luxurious accessories and for this reason the high grade British car more than maintains its ascendancy.

THE EMPIRE COTTON GROWING COMMITTEE.

India is, or should be, greatly interested in the details of the scheme for the future organization of the Empire Cotton Growing Committee which have just been published. This enterprise, as will be remembered, aims at stimulating the growth of cotton in British possessions and if possible making Empire self contained in the matter of raw cotton. During the war we felt actually the disadvantages of drawing our supplies of cotton largely from foreign territory and even now the drawbacks of the system are seriously incommoding our trade. With proper methods of cultivation and organization there is no possible reason why every pound of cotton used in British manufactures should not come from British sources. The Association now started on its career ought to do much to hasten the accomplishment of that desired end. Its funds, derived partly from Government grants, partly from subscriptions from the Cotton Trade, are adequate to the financing of arrangements eminently calculated to produce practical results. There is to be a well organized central establishment at Westminster, with a representative Executive Committee to carry out the policy which will be decided by a general Administrative Council

representative of the various interests concerned. The executive work will include research work, training facilities, correspondence, advice and information abroad, the maintenance of relations with cotton growing countries of the Empire, and the organization and carrying through of pioneer work in suitable areas. It is anticipated that the more important members of the Imperial group such as India and the Dominions will prefer to finance their own activities; but no doubt is entertained that the scheme will be welcomed, especially in the tropical areas of the Empire, because of the promise it holds out of increased production of superior grade of one of the most valuable staple products of industry.

IMPORTANCE OF RESEARCH WORK.

How important research work in connection with economic products is, is aptly illustrated by a report of the Imperial Mineral Resources Bureau which has just been issued. Dealing with arsenic, Fuller's earth, chrome ore and magnesite, the report shows in a vivid way what value attaches to original sources of the supplies of these products and how necessary it is to make the most of them. Arsenic, for example, which cost only £13-12-6 d per ton before the war was sold at as high a price as £145 per ton in February 1918. In the United States the production of the drug has risen from 2,280 tons in 1913 to 10,275 tons, an output in excess of that of the entire British Empire to-day. It is interesting to note that this increase has not been made possible by the opening of new sources of supply, but by the recovery of waste arsenic from iron smelting fumes and the transformation of what was a public danger into a valuable product. Chromium Ore is a product of immense importance in the production of special classes of the munitions of war such as armour plates, and recently it has been employed with advantage in the production of steel which does not rust when attacked by print acids, sea air or salt water. Before the war Rhodesia and New Caledonia between them supplied the bulk of the world's consumption. Now Canada and India are drawn upon for a large portion of the home consumption of the ore the former contributing 33,000 tons and the latter 50,000 tons in the year.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

Thick Cotton Spacing.

Washington, D.C., U.S.A., Aug. 19, 1920.—

A large number of government experiment stations are publishing the results of tests on thick spacing of cotton, as opposed to the old system of wide-spacing. Without exception, they demonstrate the value of thick spacing, or the single-stalk culture system, that has been advocated by the United States Department of Agriculture for several years past. Some of the agricultural journals are commenting on the reports of the experiment stations, and, while they advise planters to adopt the thick spacing system, they believe that the old system has become so thoroughly established that its overthrow will be difficult.

That there may be a proper understanding of the scientific principle on which the thick-spaced method is based, department specialists have attempted to make that clear in a statement just issued, and which should prove interesting to readers of the "Journal."

Cotton produces more lint when it is thick in rows than when it is thin in rows because of a somewhat unusual branching characteristic. The cotton plant puts out two kinds of branches—short lateral branches that bear fruit and long, heavy, vegetative branches that are, in effect, secondary stalks. These vegetative branches finally put out lateral fruit branches, but they require a long season in which to do it. Under adverse conditions, such as draught or boll weevil infestation, they do not produce cotton, because their fruiting season is so late that the adverse condition, whatever it may be, frustrates it.

If cotton is sufficiently thick in the row the plants put out only fruiting branches. There is no room for the vegetative branches to grow. Therefore, mere plant growth is

restricted and the vitality of the plant goes largely into lint production. The result is that the bolls are put out and mature much earlier and more profusely than when the plants are far apart, and boll weevil and draught injury are minimized.

Cotton persists in growing thick in the row, no matter how sparsely the original plants may be spaced. Each vegetative branch or secondary stalk is essentially a new stalk of cotton. It grows on the same root stalk, but it takes up as much space, as much moisture, and as much soil nutrition as if it were a separate plant.

Experiments conducted for several years by the Department of Agriculture showed that cotton 3 feet apart is in effect just as close together as cotton 3 inches apart—that is to say, when the cotton is spaced 3 feet apart it puts out enough vegetative branches or secondary stalks to make the equivalent of one stalk every 3 inches. These secondary stalks are not the disadvantage of being several weeks later than the original stalks, and therefore cannot come into bearing nearly so early. This might not reduce the yield during a long growing season, but where the boll weevil has to be contended with the secondary stalks rarely succeed in producing bolls and the entire yield is confined to the portion of the plant above the topmost vegetative branches.

When the plants are thick in the row all the branches are fruiting branches, and the plant consequently produces bolls from bottom to top. More than that, it produces them early and matures them to such an extent that they are practically boll-weevil proof before the boll weevil infestation reaches the danger stage.

Experiments made by the Department of Agriculture some time ago showed that cotton plants 3 inches apart produce a great deal more lint than plants 3 feet apart, and that the same is true of all intermediate stages. In other words, the widest spacing is the

worst system, and any narrowing of the spaces down to 3 inches is an improvement. Below that the crowding may be injurious. These results have been confirmed recently by experiments carried on at state stations. Here, for instance, are the results of a series of experiments carried on at the Delta Experiment Station, in the state of Mississippi:

				Pounds per plot
Plants	8 inches apart	...	..	117
"	12	"	...	93
"	16	"	...	90
"	20	"	...	59
"	24	"	...	57
"	28	"	...	56
Unthinned or left as placed by the planter, average of 2 plots				134½

When two plants were left together, at these same distances between the hills, the results were as follows:

				Pounds per plot
2 Plants in the hills,	8 inches apart...			112
Do	12	"	...	109
Do	16	"	...	99
Do	20	"	...	92
Do	24	"	...	86
Do	28	"	...	71

It must be remembered by cotton planters practicing the thick-spacing system that another change from the old methods is necessary at the same time. When cotton is spaced far apart it is thinned early. When close spacing is adopted the thinning must be delayed until comparatively late in the season. If the thinning is done early vegetative branches are likely to appear even when the plants are thick in the rows, thus offsetting such advantages as might be gained. It is not possible to fix any definite time at which thinning should be done, but it is safe to say that the plants should be from 6 to 12 inches high instead of from 2 to 4 inches high, as has been customary in the past. Planters who, either by design or because they are unable to get labor for thinning work earlier, postpone their thinning

until late in the season should adopt the single-stalk close-spacing system. If, late in the season, they chop out the cotton to conform with the old-time standard, they run the risk of greatly reducing their yields.

Close spacing and delayed thinning does not mean that there must be no cultivation until after thinning. Cultivation to control weeds, of course, must be undertaken whenever the development of grass or weeds shows that cultivation is needed.

ROADSIDE TELEPHONES.

Nearly all great inventions—probably barring the mysterious ones of Mr. Edison—simplify the problems of life by means so simple that everyone wonders why he did not hit upon the device. For example, a great fortune was made by the invention of a machine which made wooden screws with points upon them. In these days when any one sees an old-fashioned wooden screw, as large at one end as at the other, for which a hole had to be bored with a bit, wonders why the first man who thought of a wooden screw did not think of threading it to a point.

Now, telephones are to be installed upon many of the principal public roads and highways of the country for the convenience of travellers. The plan being put in operation is to put up a small booth at each milestone. The motorist or other traveller who is stranded or otherwise comes to grief is then never farther than a half mile from a telephone.

The plan provides so simply for one of the most vexing problems of road travel that it seems that it should have been devised many years ago. The "road telephone" is an institution so obviously necessary and essential that it rates with the screw-point as something which should have been discovered and put into use long before it was.

The custom of the last decade of the nineteenth century to hunt up the nearest farmer who would, for a somewhat fabulous price, provide a pair of mules to tow a

stranded automobile is in a fair way to be obsolete in this twentieth century. There is always towing service, as well as tire service and other service, within hailing distance if only telephone can be reached. That's the big and helpful feature of the road-side telephone plan. Tramping to the nearest farmhouse—which may be anything but near—which has a telephone is often extremely arduous and wearisome. The motorist, of course, is welcomed sympathetically by the farmer, but very rarely so by the farmer's dogs. And the dogs must be encountered, dealt with and compromised with before their owner can be reached. They form the alert outguard of the rural home.

The evolutionary outgrowth of the roadside telephone would be the telephone instrument, carried in the tool-box of the machine, with which the stranded or wrecked motorist could tap any wire at any point and utter his Macedonian cry.

With such an instrument and a trusty pair of lineman's climbing irons with which to run up telephone poles to order gasoline, tubes, casings, tools, and other emergency necessities the tourist would be able to keep in touch with all that frees touring from the burden of anxiety. And this is coming.

MOTOR OILS DELIVERED BY AIR PRESSURE.

Motorists who stop for fuel at many points in the southern part of the state of California get quick and efficient service, and, beside, see the kind of oil they ask for drawn from a row of faucets like fruit syrups at a soda fountain. These stations are said to be the only ones in the world where such an efficient system of handling oils has been installed.

Six standard grades of lubricating oils are stored in tanks in the basement of the service stations, and each of the reservoirs has six pounds of air pressure on top of the oil. Thus the attendant on the street where the motorists drive in, upon receiving an order for a quart or a gallon of oil, takes the

Quart or gallon measure and draws it off like taking water from a hydrant. Light oil flows from one cock, medium oil from another, heavy oil from still another, and so on.

The oil is forced through the pipe system by the air pressure which is kept at just six pounds by an automatic electric pump. As the oil is removed and the pressure falls, the mechanism automatically starts the pump and renews the pressure to six pounds.

The amount of oil in each reservoir is indicated by an ordinary boiler gage glass near the base. When a reservoir is emptied the electric air pump is switched off. An air cock on top is then opened to release the pressure and a barrel of oil is poured in through a large pipe by opening the bung over a drain hole in the sidewalk above. The air cock is closed again after the reservoir is filled and the pressure is immediately renewed by the pump.

A NEW RECORD IN WIRELESS TELEPHONY.

The cities of New York and Chicago have been put in regular wireless telephonic communication with each other. Robert F. Gowen, of New York, is the man who is making the low-powered wireless telephone come true, and it is the half million members of the American Radio League who are helping him make his experiments successful. These members are scattered all over the United States.

Mr. Gowen is the inventor of the audion lamp equipment and the man who has made vital improvements in the vacuum tubes which are so important a part of the wireless telephone. It was only recently that he had his equipment installed and got ready for the test which would determine whether the one-third of a kilowatt generator and 360 meter wave length he proposed to use would carry the human voice far enough to make the radio telephone practicable.

A year ago, it will be remembered, the United States Navy sent the human voice around the world, 25,000 miles, by using a 300 kilowatt generator and a wave length of more than 3,000 meters. But the cost ran up into the thousands of dollars and made the radio telephone so expensive as to be prohibitive for commercial work at long distances. This was the thing that Mr. Gowen and his enthusiastic half million assistants wanted to correct.

Previous to the successful experiment made between the two great American cities, word was sent that on a certain night at a certain hour an effort would be made to talk without the use of wires from New York to Chicago, 750 miles away. Chicago, R. H. G. Matthews, vice president of the American Radio League and lately in the radio service of the United States Navy, sat at his instruments with the telephone receivers clamped to his ears. Late at night, so that interruption would be less likely, Gowen's voice came over the wires. He spoke of the weather and the difficulties New York was having with a snow-storm. Then he started a phonograph to playing, and, if there had been room in the little shanty on the bleak shore of Lake Michigan, a dance could have been held in Chicago to the music played in New York, so distinctly was the latter heard for many yards around the room. They tried it again the next night, and the next, and for several nights thereafter. Then Gowen called halt, went to bed and slept the clock around. He had worked night and day with only a few hours of sleep for a week.

But the joy of the experimenters was further increased a few days later when Gowen received letters, narrating the conversation at he had held and the tunes he had played, from other wireless stations at Topeka, Kansas; Valley City, North Dakota; Battle Creek, Michigan; and Gaffney, South Carolina. Instead of stopping at the 750 miles he was trying to span, Gowen's

small power apparatus had thrown his voice more than 1,500 miles around.

As soon as some slight changes are made in the receiving sets Gowen is going to make an effort to talk with Roswell, New Mexico, and then with San Francisco, on the Pacific Ocean. If he can accomplish this he will know that the radio telephone as a commercial probability in the near future is assured.

Meanwhile, at the Chelmsford Station, near London, England, other experimenters are making daily efforts to talk with America. Unfortunately, the hour which is best for the English experts does not offer the best of conditions in America, and so far there has been nothing to indicate that low-power is sufficient to send the human voice across the Atlantic Ocean.

"But we are on the right track," says Gowen. "We have not yet reached the limit of the equipment we are using and any night we may expect to hear the voice calling to us from across the Atlantic."

Operators hearing Gowen "speak" were aware that a new record had been set in wireless telephony without great power, and a wonderful invention give assurance of great possibilities.

ALFRED T. MARKS.

NOTES.

A correspondent writes to a contemporary:—As regards soap, it is argued that Ceylon is specially well placed for the creation of the industry for the island itself produces the essential oils which would be largely used in the manufacture and not a great deal would need to be imported from outside if we except a certain quantity of tallow which would have to be imported from Australia for purposes of hardening perfumed soap. Any company starting to make soap on a large scale in Colombo would probably require help from the government in certain directions, particularly support against dumping from the outside, which experience shows can be made to strangle the life out of any new industry. In Australia the government gave, as is known, a bounty of so much per ton for five years to establish on a sound working footing iron works in New South Wales. In Australia, of course, the policy of preserving the life of local industries against unfair outside competition has full support in every State. Protection such as would be required in Ceylon for any new industries could probably best be given in the form of import duties, and the principle of this has long ago been accepted, notably in the case of the import duty on tea. I take up this subject to-day because I understand that at the present time enquiries are being made with the idea, if practical government assistance is forthcoming, of attempting to establish in Ceylon the new industry of soap manufacture. The commission pointed out that the most serious question affecting soap manufacture is the uncertain cost of cocoanut oil, and that soap manufacture here can hardly be expected to pay a reasonable profit unless the price of cocoanut oil is at medium or low level. This is a difficulty which of course would have to be borne in mind by those making the experiment. I understand

that it is not considered an insuperable one, however, and that given practical encouragement by the local government the necessary capital should be forthcoming to test the chances of success of this new Industry. Soap manufacture in Ceylon was one of the chief subjects taken up by the local industrial commission. The commission found that soap was being manufactured on a small scale and that capital was needed to develop the industry. Small factories started for manufacturing soap from cocoanut oil met with but moderate success, due largely to lack of experience on the part of the makers. No doubt in due course the report of the commission will receive careful attention in view of the importance attached by the Secretary of State for the Colonies to establishing industries in order to make the various parts of the Empire independent as far as possible of overseas manufactured articles. If it is found that soap manufacture on a fairly large scale in Ceylon can in course of time be profitably engaged in, then, apart from the large local consumption that would be created, there are considerable possibilities for export trade, notably to India, the F. M. S. and East Africa, among other countries. What the policy of the Ceylon Government will be with regard to facilitating the establishment of new industries remains to be seen. In India, as you are well aware, both in the Native States and in Imperial territory, the importance of helping on new industries has been recognized and very liberal assistance is given to pioneer companies. Mysore State, for instance, gives favourable customs and excise concessions, and in one case, that of the Mysore Pharmaceuticals, Ltd., exemption from taxation for 20 years.

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The following is a description of the stem bleeding disease of the Coconut palm caused by the fungus *Thielaviopsis ethacetica* as circulated by the Madras Agricultural Department:—The first indication that a tree is diseased is the exudation of a dark

reddish-brown fluid from the cracks usually found on the stem. This fluid is reddish-brown at first and turns black as it dries on the bark. Behind the bleeding portion of the bark, the tissue is found to be decayed and has a yellowish-brown colour. In the early stages of attack the discolouration and decay of the tissue is localised. In the later stages when there are more than one bleeding patch seen on the surface, the decay is not localised but there is a general decay of the internal tissue. When the disease reaches that stage, the tree ceases to bear nuts, the crown diminishes to a few stunted leaves and finally the whole tree dies. On young trees the effect of the disease is at its worst, especially if the attack is at the base. In such cases, the external patches give no indication of the extent of the internal decay generally. The soft tissue inside rots and a cavity is formed in the central portion of the stem. There is an accumulation of some thin yellowish fluid which gushes out when the cavity is opened. If the decay happens to extend downwards, the tree becomes hollow without any external signs of decay. There is no treatment in such a case except to dig up the whole tree, carefully remove every bit of the roots and burn them on the spot. The progress of the disease seems to depend upon the age of the tree. If the infection is localised, removal of the diseased parts is the cheapest and most effective remedy. The diseased part of the coconut stem should be completely cut out and even a little more of the healthy tissue, say about one inch to make sure that all the diseased tissue has been removed. There is no difficulty in determining how much must be cut out since the decayed tissue which is yellowish brown can very well be distinguished from the surrounding healthy tissue which is flesh coloured. The best instrument to use is the ordinary one inch chisel and mallet. The decayed tissue cut out should be collected and burnt at once. The cut portion thus exposed should be tarred immediately after

cutting. As tar does not adhere well to a wet surface, the cut portion should be scorched or dried with a torch made up of a small bundle of dried coconut leaves. The tar is then applied hot, for this secures administration of the tar to some depth inside the tissues.

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A correspondent of *Near East* writes:— It appears that if a small percentage of dry chloride of lime is added to cement, or if a quantity of this is dissolved in the water with which it is to be mixed, the result is that the cement sets with extreme rapidity. This was made use of in the war, when concrete heavy gun foundations were made and were ready for actual use in less than three days. The question has been raised as to whether cement or concrete made in this way would be as durable as that which had been allowed to set at a slower rate, and quite recently the results of some tests commenced rather over a year ago have been made public. In view of the fact that quick-setting cements of the ordinary type are not all as permanent in character as could be wished, and with a knowledge that the engineering world would want some definite information to go on, these tests were instituted almost immediately after the chloride of lime theory was carried into practice. Laboratory samples of cement and concrete of various qualities were prepared and subjected to compression and other tests periodically. The results, which are for 4 per cent solution of calcium chloride used as mixing water, show that the effect is actually to increase the strength at all ages up to one year—the duration to which the experiments have extended to the present. There seems no reason to doubt the accuracy of the tests or their far-reaching nature, and consequently it would seem that contractors for road building, public works construction, and the like, can shorten the time of building considerably. Concrete road foundations, for example, would be ready for the laying of the blocks or the carpet

within a comparatively few hours, and not only would the work be expedited, but the inconvenience to the public and to traffic users generally would be lessened. At the same time it would be well were the experiments continued, and I should like to see extended and exhaustive tests made by some representative body. My reason is that I have always understood that chloride of lime had a remarkably strong affinity for water; was markedly hygroscopic in character, and unless some chemical change takes place when it is mixed with the cement it would seem probable that its use would tend to make the concrete damp. I have an idea that damp concrete would tend to disintegrate. I may be wrong, but, at any rate, I should like to know that further research work was being undertaken in this connection.

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In view of the increasing price of natural oil and the growing fears of a coming shortage, it is not to be wondered at that engineers have been devoting time and attention for some time past to the question of finding a substitute which shall be obtainable in adequate quantities, be comparatively low in price, and which shall have approximately the same heating value. The first really promising result of their work has been the production of the new liquid fuel, which has been given the name of Colloil. Scientific research has demonstrated the possibility of resolving most substances to a colloidal state, in which the particles are so finely divided that they are formless and to some extent resemble a fairly stiff liquid glue. It has been found that coal washings which have hitherto been dumped at the pit-head, the refuse from saw pits and paper mills, and the sludge from commercial coal cleaners can be brought to this condition and intimately mixed with oil residues and fuel oils. In this connection the oil obtained from low-grade coals, peat, and lignite by the low temperature process of distillation is particularly

suitable. This mixture may be burned in the same way as any other liquid fuel, and can be used with most existing types of burners, and thus, in addition to become a competitor with and a substitute for oil, it also competes with the comparatively newly adopted system of burning powdered coal driven by air or steam pressure through a jet into the furnace. It would seem that this new method would provide a means whereby good use could be made of the quantities of anthracite dust which have accumulated, and which it is difficult to use in any other known way. The percentage of oil and dust in the new fuel are about equal, and it is said that the cost of production should not exceed the price at present paid for coal which would have, weight for weight, a far lower calorific value. The new fuel, so far as the latter point is concerned, and when anthracite dust is used, would compare more than favourably with oil, and should be obtainable at about half the price of fuel oil as soon as working is commenced on a commercial scale. The essential claim for the new fuel, however, is that fuel dusts, which are difficult or impossible to use in any other way, can be utilized to advantage and satisfactorily burned in an ordinary furnace.

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A. Government of Bombay notification issued by the Revenue Department (Development) gives the following information regarding the issue of a 6½ per cent Income Tax Free Loan for development and housing purposes: "With the sanction of the Secretary of State for India in Council, the Government of Bombay have resolved to issue a loan for the purpose of financing the housing and other schemes of development to be undertaken by Government in and around Bombay and by the Bombay Municipal Corporation, by the City Improvement Trust, Bombay, and by the Bombay Port Trust. The loan will be secured on the revenues of the Government of Bombay, to be allocated under Section 30 (1) (a) of the Government

of India Act, 1919. Subscriptions will be received from September 8 to October 30 inclusive. The Government of Bombay undertake to repay the loan at par on November 1, 1935. The issue price will be Rs.100 for every Rs. 100 of loan applied for. Interest will be payable half-yearly at the rate of 6½ per cent per annum on May 1, and November 1, at the head office, or any branch of the Bank of Bombay. Advance interest from the date of purchase up to October 31, 1920, will be paid at the time of issue of the temporary receipt. Interest on the loan will be paid throughout its currency free from income-tax, liability for which will be discharged by the Government of Bombay at the rate for the time being in force; but such interest will be taken into account in determining the rate at which the tax will be levied on other incomes and will be liable to super tax. A sum equal to 1 per cent of the aggregate amount of the loan will be set aside annually to form a fund to be used for the purchase of loan at or below par and cancellation thereof. The loan will be issued in the form of promissory notes in denominations of Rs. 100, Rs. 500, Rs. 1,000, Rs. 5,000, Rs. 13,000 Rs. 25,000 and Rs. 1,00,000.

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In engineering circles generally the memorandum issued by the Fuel Research Board, which is considering the whole question of fuel for use in connection with internal combustion engines, under the auspices of the Department of Scientific and Industrial Research, has been received with some degree of amusement. It would seem as though the committee had carefully avoided going into any but the most orthodox and old-fashioned suggestions for producing power alcohol; had judged these wanting, and then had immediately rushed out a report to say that in their opinion nothing could be done in the matter. One or two writers on the subject have been content to take the findings of the board as final, and recently one definitely stated that power alcohol was an

imaginary fuel . . . neither practical nor possible. As a matter of fact, it is a very practical and possible fuel that has been used for internal combustion work in certain other countries for many years, either alone or in combination with benzol, petrol, or paraffin. It is argued that power alcohol, made from barley, would cost for raw material alone about 7s. per gallon. If potatoes were used the cost would be about 8s. 6d., while in the case of mangolds the cost would be 3s. Obviously, very considerable acreages would be required to grow the crops, and for a production of 250,000,000 gallons (the estimated consumption of petrol in the United Kingdom this year) it would be necessary to put 5,593,293 acres under barley, 211,864 acres under potatoes, and 1,282,513 acres under mangolds. This is all very much beside the point. No engineer would propose to grow barley or mangolds for distillation. On the other hand, he would produce his alcohol from other starch-containing vegetation; from the waste lye of paper and pulp mills; from the Indian bassia flowers; from calcium carbide; and from a host of other readily available and cheap materials.

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The future of the sewing machine trade deserves the serious consideration of every one in the trade in this country, particularly of those interested in sewing machines and supplies. It is a pity that up to now India has been entirely dependent upon foreign countries for the supply of sewing machines and parts. During the war in spite of a total restriction of imports of German sewing machines 251,443 machines were imported into India from the United States, which were sold at exorbitant prices with a profit amounting to almost 400—500 per cent. There is absolutely no reason why India should not take full advantage of this opportunity and not introduce and advance its own industry. The losses during the war, the scarcity of machines and the expansion of trade, are facts that combine to uphold the

present prices for some time to come. The shortage of sewing machines in relation to this country's demands and requirements has been very severely felt by sewing machine dealers and buyers alike in India, and is likely to continue unless sewing machines are manufactured in India itself. In view of the growing consumption of sewing machines in the country and in spite of the immense quantities of imports from different parts of the world, even if a large number of factories are started they will hardly be able to turn out sufficient quantities to cope with the demand. Consequently a sewing machine factory is bound to achieve success and afford to capitalists the safest and best investment. Since the prices of sewing machines have gone up considerably and they are still not available, it is the most opportune moment for India to introduce this industry; and a great inducement for floating a company is that a heavy duty on the import of sewing machines is expected to be levied, which naturally will place the company in a position to compete favourably with machines manufactured in any other part of the world.

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In view of the present scarcity in the supply of cotton, the attempts now being made to establish cotton growing on a large scale in Mesopotamia are of particular interest. Cotton has been grown in Mesopotamia from very ancient times and is still cultivated in small quantities by the Arabs in conjunction with food crops along the banks of both the Tigris and Euphrates. The fibre is used locally for spinning and as a stuffing material for pillows and mattresses. The country possesses a soil and climate favourable to the production of large yields of excellent cotton and in course of time it should add materially to the world's supply. Since 1917 experiments have been conducted by an expert from the Indian Agricultural Service with a view to discovering the most suitable kinds to grow, and the results of the work done in this connection and the pros-

pects of establishing a cotton growing industry are fully dealt with in the current number of the *Bulletin of the Imperial Institute*. So far, American types of cotton seem to be the most suitable for cultivation in Mesopotamia. The members of a deputation of the British Cotton Growing Association, which visited the country towards the end of last year, were very favourably impressed with its possibilities for cotton production. The acreage which will eventually be planted with cotton in Mesopotamia will depend on the quantity of labour available and the area on which a perennial supply of water can be guaranteed. It seems likely that a total of 150,000 to 200,000 acres could be cultivated annually by the existing population if the necessary facilities, in regard to agricultural machinery, transport, etc., were provided. At a low estimate this area should produce from 15 to 20 million pounds of cotton yearly.

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The Acting Commercial Secretary to H. M. Legation at Berne says:—One of the chief industries in Switzerland is the manufacture of silk goods, of which the centre is Zurich. This silk industry dates back to the thirteenth and fourteenth centuries. During the last 50 years the district of Zurich has concentrated its energies on silk textiles, whereas Basle has made a speciality of silk ribbons and floss silk. The following table gives the extent of the export value of the Zurich textile industry and the Basle silk ribbon and floss silk industries for the years 1907 and 1913-19:—

	Export value in millions of francs.			
	Zurich	Basle	Basle	
	fabrics	ribbons	Silk	
	Silk	Silk	Floss	
1917	... 117·9	45·7	27·2	
1913	... 112·5	42·0	28·3	
1915	... 128·4	60·0	29·0	
1916	... 167·7	73·1	61·0	
1917	... 144·0	54·8	52·7	
1918	... 110·5	52·9	38·7	
1919	... 427·0	104·0	55·0	

To the above figures may be added ten million francs' worth of silk tamingy from Thal (St. Gall). Switzerland also possesses a large factory for artificial silk in Emmenbrucke, near Lucerne. Basle is the chief centre for silk ribbon weaving and competes successfully with France, Germany, and the United States of America. In 1916 the value of silk ribbon exports reached a total of 73 million francs, and in 1919 the value of such exports exceeded 100,000,000 francs.

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The passing of the Imperial Bank Bill took up the entire afternoon session of the Imperial Legislative Council on the 8th Sept. last. There were twenty amendments to the Bill, twelve of which were in charge of Mr. Hailey. Mr. Muddiman piloted three, Mr. Tata moved two, and Mr. Nathmal moving the rest. Mr. Hailey, in moving that the report of the Select Committee on the Imperial Bank Bill be taken into consideration, said the Bill was discussed at length at Delhi in March last, and the report of the Select Committee was unanimous. Several changes had been made in the Bill, and he did not propose to touch on its principles. The amendments were then taken into consideration, the official ones being accepted, and of the non-official amendments four were withdrawn, two were accepted, and one was rejected. Mr. Hailey finally moved that the Bill as amended be passed. He said the Council had come to the end of a long list of events. The Bill was intended to afford improved banking facilities. The three Presidency Banks had a long and honourable career. He disproved the fear that the Imperial Bank would be a dangerous competitor to private banks. It would, on the contrary, enhance the economic and industrial progress of the country. From the ashes of the Presidency Banks would now arise a bank with a wider scope, called the National Bank of India. The Bill was finally passed amidst cheers.

Before the war, says a correspondent of the *Times of India*, we used to import lampware from Germany to the extent of 28 per cent, from Austria-Hungary to the extent of 28 per cent, from Belgium 11 per cent, whereas England sent out only 7 per cent. In 1917-18 even that percentage dwindled to 6, while Japan's exports of glass rose to 90 per cent. Even in the matter of tableware the same decline is to be noted. England exported 33 per cent of sundry glassware to India before the war, which has now descended to 20 per cent, while Japan has rapidly climbed up from 19 to 70 per cent. During the same period the opportunities extended to India of self-improvement and advancement were fully utilised, a point on which the Indian Munitions Board comments in its latest report. The report also says that India is still unable to turn out useful tableware, though nearly fifteen glass manufacturing factories are now producing other glass manufactures. Glass tubes, flasks and bangles have absorbed the attention of the manufacturers.

The Madras Publicity Bureau says:—The Government have directed the transfer of the School of Arts, Madras, to the Department of Industries. The Director of Industries has been requested to submit proposals, in consultation with Mr. Hadaway for the reorganization of the school. Mr. Hadaway will be in future the Director's expert adviser in respect of artistic Industries throughout the Presidency. The attention of the Director of Industries has been drawn to the Secretary of State's Despatch No. 9 Public (Educational), dated 6th February 1896, printed in G. H. 341 Educational dated 8th June 1896, laying down the principle that the function of the school should be the encouragement of Indian Art so as to develop the special artistic tendencies of the people with whom it deals and enrich those industries in the products of which beauty of form or colour or both may be superadded to the primary purpose of utility; and he is requested to ensure that this principle is kept in view.

It is stated that there has been finally perfected in Honolulu a machine which will separate the fibre from the pulp of banana stems. As is well known, after the fruit is cut, the stem of the banana plant either dies

to itself, or is cut away. For lack of a machine capable of dealing with these stems the valuable fibre contained in them has hitherto been wasted. The ordinary banana acreage is given as from 400 to 600 plants. From each of these it is expected that 2 lb. of fibre can be extracted by the newly invented machine. Besides extraction of the fibre the same machine separates the pulp which will make an admirable ingredient in paper stock. A banana plant consists of about 93 per cent water, 3 per cent fibre and 4 per cent pulp. There appear to be great possibilities before this industry, both in the production of fibre and in the utilization of the pulp in paper manufacture, says the *Wealth of India*. (Vol. IX, No. 1.)

It appears from the official report of the proceedings of the sixteenth session of the Travancore Popular Assembly, just issued to the press, that schemes for the establishment of a pencil factory at Alwaye and a match factory at Nagercoil at private expense have been sanctioned. A pencil expert, trained at the expense of the State, has been appointed to supervise the match factory. An investigation into the possibilities of the paper pulp industry has been taken up by the Department of Industries. Arrangements have also been made for the organization of industrial conferences and exhibitions and for the formation of industrial associations in important centres. Efforts are also being made to establish an Industrial Museum and Bureau in Trevandrum. These indications of industrial activity are refreshing.

The *Manchester Guardian Commercial* publishes particulars from its Basel correspondent of one of the biggest deals ever put through in the history of the dye industry. It involves an account exceeding 25,000,000 francs (£1,000,000) and refers to the acquisition of a factory in America by the Swiss colour manufacturers. The Swiss dyestuff producers are co-operating under an agreement made during the war by which they pool their profits. This colour ring is composed of the Society of Chemical Industry, the Sandoz Chemical Works, and the Geigy Chemical Works, all of Basel. They have recently purchased the establishment of Ault and Wiborg, a factory of dye products in Cincinnati, Ohio.

GLEANINGS.

In order to hasten reconstruction, Bulgarian law provides that all males give to the State, for a certain period during the year, their service in whatever capacity it may be desired. Road construction is now being undertaken, and by this means roads which are in a state of disrepair will at once be put in order.

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Trinidad petrol is being sold in some of the neighbouring colonies at a much smaller figure than in the colony where it is produced. A section of the Trinidad Press is urging the Government to issue an order prohibiting the exportation of the article until a prescribed quantity is placed on the local market at a fixed rate.

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In order to develop the sugar industry in the eastern section of Jamaica, the Government has been asked to arrange with large property owners to assist in formulating a small cane farmers' scheme whereby the peasantry would be able to procure lands, in from five to twenty acre lots for a period of 10 or 20 years at moderate rental.

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Returned soldiers now on the employment registers of the Australian Repatriation Department number 7,556 or only 3 per cent of the total number of men discharged from the Australian Imperial Forces to date. On March 24 there were over 15,000 seeking employment, with 14,000 still to be demobilized.

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A prize of \$25,000 (about £6,000) has been offered by Mr. Raymond Orteig, of New York, for the first airman to cross the Atlantic in an aeroplane or seaplane, from Paris or the French coast to New York or from New York to Paris or the French coast within five years as from May 28, 1919.

In the House of Representatives at Melbourne, last month, Mr. Hughes, the Prime Minister, stated that a record area was under wheat in Australia. The prospects were exceedingly favourable, he added, and there was every possibility of a most satisfactory yield.

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The New South Wales Government has completed the construction of the storage portion of a terminal elevator of 5,000,000 bushels capacity at Sydney, and is now erecting the remaining portion, which it hopes to complete in 18 months.

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Canada's wheat crop for 1920 is estimated by the Department of Agriculture at 262,338,000 bushels, as compared with 193,260,000 for last year; the oat crop is estimated to yield 496,906,000 bushels, as against 394,387,000 last year.

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While the Jewish people will be permitted to develop and reap the harvest from land purchased in Palestine by the Jewish National Fund, and also be privileged to leave it to their children, they can never sell it.

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It has been decided by the Canadian Government that the present Wheat Board is in function in so far as the wheat crop of 1920 is concerned. In marketing the crop people must revert to the methods of normal pre-war times.

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Rio de Janeiro business circles are demanding from the Brazil Government permission to export 70,000 bags of sugar. The Pernambuco sugar harvest will commence very shortly and is expected to be an abundant one.

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According to the Report on the Administration of Indian Companies Act, in Bengal, recently issued, 306 Companies under Indian

mangement were registered during 1919-1920 as compared with 71 in the 1918-1919.

A start is expected to be made with the State University at Cairo next academic year. The report of the Committee is now ready, and the Cabinet will shortly discuss the project.

Looted treasure was known to have got into the hands of undesirable persons, and the Council of the Association of British Dealers decided to take joint action in this illicit traffic.

After three and a half year, the Government control of wool in Australia has been given up, and business has been resumed in open market. Prices are about 50 per cent above pre-war rates.

There is the same shortage of housing accommodation in Algeria as in other parts of the world. The increased cost of building material and high cost of labour has also checked the construction of hotels.

An enormous increase of business at Antwerp will result from the new canal connecting the Rhine and the Schelde, as when completed, it will shorten the waterway from the Upper Rhine to the sea.

At a recent meeting of 527 West, Australian farmers, it was unanimously decided to subscribe £250,000 towards the £1,000,000 required for the establishment of wheat elevators.

A recent German estimate prepared by experts states that the European sowing of beet will show an increase of 13.12 per cent over last year. Russian Ukrain is excluded from this forecast.

United States Customs officials have intercepted a packet from Russia to "Comrade

Martens," containing more than 100 diamonds which are believed to be part of the famous Russian Crown jewels.

The Government of India have been offering for sale in the United States large stocks of textiles, consisting of flannel, khaki cloth, mosquito netting, towel cloth, woollen cloth and calico.

According to a statement in the annual report of the Malaya Planters' Association should the present demand for motor tires be maintained by 1934 there will not be enough rubber to cope with it.

As a result of the distress of agriculturists due to the effects of the drought which has recently broken a total of £776,200 had been distributed in relief by the New South Wales Government.

The high price of sugar and the Queensland cane sugar shortage are encouraging beet sugar growing attempts in Western Australia. Seeds have been applied for from England and the United States.

In connection with a proposal to instal a wireless telephone system in Manitoba, successful experiments from Winnipeg to Portage La Prairie (60 miles distance) have recently been concluded.

For the purposes of stimulating international trade relations Commercial Attaches have been added to the Brazilian diplomatic *personnel* in London, Paris, Washington, Buenos Aires, Santiago, and Berlin.

According to the Japanese Shipping Controller, last year the tonnage of merchant vessels built in Japan amounted to about 700,000, this being about ten times the pre-war output.

The future exportable surplus for Greater Roumania is estimated at 5,000,000 tons of cereals, in addition to 500,000 tons St. Petersburg standards of timber and 1,000,000 tons of petroleum products.

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Foreign emigrant ships, sailing from Spanish ports, will now be subject to a progressive tax, which starts at £413 for 2,000 emigrants.

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Sweden is proposing to erect one of the largest wireless stations in the world, able to be in constant communication with North America.

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By 36 votes to 19 the Australian House of Representatives passed the second reading of the Industrial Bill establishing tribunals to deal with labour disputes.

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It has been decided to consider a scheme to form a National Opera Company in Sydney, New South Wales, and to seek Government financial assistance.

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Food production in Portugal is reaching a crisis, and a former Minister of Agriculture predicts famine unless the home production of wheat be considerably increased.

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Industrial Councils are to be formed in Australia, to consist of a chairman and six members, three representing employers and three employees.

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An aeroplane race from New York to San Francisco for the Pulitzer trophy, which is to be known as the National Aeroplane Race, will be held in October or November.

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Sir Joseph Cook stated, in the House of Representatives at Melbourne recently that the Commonwealth's war debt amounted to £313,000,000.

Holland is making active preparations for the celebration of the Tercentenary of the Pilgrim Fathers, which will take place between August 29 and September 2.

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The *Moniteur* announces that owing to various denunciations of the 1902 International Sugar Convention, the International Sugar Union ceased to exist on September 1.

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Under Government auspices the United States' aniline dye industry, which was non-existent five years ago, has now £9,000,000 invested in it.

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The Pacific Mail Steamship Company recently concluded an arrangement whereby it will erect a private pier at Manila four times as large as any now existing at that port.

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Direct communication between Tangir and Teutuan has been established over a newly-constructed tract by a daily road service of four-seater motor-cars.

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Seven bird sanctuaries have been established in Alberta, with the idea of protecting the chief breeding areas of wild birds and to insure the various species against extinction.

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Plans for the expenditure of \$40,000,000 (£8,000,000 pre-war) on highways in Quebec and Ontario have been approved by the Canadian Government.

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Antwerp is now the starting point of 89 navigation companies, many of the lines going to all parts of the World. It is also the calling point of 40 foreign lines.

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Sugar export, which first took place from Costa Rica in 1914, amounted to 157,173 kilos, valued at 41,324 colonies. In 1919 the exports totalled 2,043,815 kilos valued at 529,428 colonies.

The Phillippines Legislative has approved of the issue of \$6,000,000 in bonds to provide funds for the improvement of the harbour of Manila.

Since May about 100 families per week have been leaving Winnipeg, "back to the land," on account of the shortage of houses in Western Canada.

A Convention between France and Poland for the transport of mails by air has been signed, and the route will follow the line Paris-Strassbourg-Prague-Warsaw.

Coal shafts are being sunk at Lampman, Saskatchewan, by the Farmer's Coalmining Company, and it is expected that the mines, when completed, will yield 1,000 tons a day.

Increases in civil servants' salaries involving a total expenditure of £387,000 have been proposed by the Government of Victoria (Australia).

Fiamingoes, having been greatly reduced in numbers by the depredations of fishermen, are to be protected by the Government of the Bahama Islands.

Frau Margarete Bruehl, the owner of a grain firm, is the first woman to be admitted to the Berlin Bourse.

There are six factories in Trinidad engaged in the manufacture of cocoanut oil, the output of which is about 140,000 gallons a year.

The total number of strikes in Holland last year amounted to 598, against 305 in 1918.

As a rubber producing country Sumatra bids fair to be the most profitable field in the world.

Owing to the increased cost of printing, the Berlin Academy of Sciences is no longer able to publish its works.

Four new banks, having a joint capital of 7,000,000 yen, have begun business operations at new Wijo and Seoul, in Korea.

The appointment has been sanctioned of a Trade Commissioner to represent the interests of Indian trade in East Africa.

Trains running with oil fuel are now making regular journeys from Nairobi to Athi River, in the Kenya Colony.

Instructions have been sent to the Chilean Minister at Berlin to engage German labour to work in the Chilean mines.

This season the area under crop in Australia is 11½ million acres, an increase of 3½ million acres over last year.

Java has this year 156,971 hectares under cane cultivation. Last year the total was 137,031 hectares.

Cargoes of coal from the United States are being delivered at Algerian ports.

ECONOMIC NOTES.

INDUSTRIES AND COMMERCE.

The Java Sugar Industry.

Java is the third largest sugar-producing country in the world, ranking next to Cuba and British India. As the last consumes practically all that it produces, Java ranks next to Cuba in sugar exports, actual production being about half of the Cuban output, and approximately three times the production of the Hawaiian Islands. Compared with the Hawaiian industry, where, it is understood, there are about fifty sugar centrals, Java has at present 186 producing mills, says the *Journal of the Society of Arts* :—

It appears from a report by the United States Consul at Soerabaya that, on account of the density of population in Java, which is estimated now to be more than 30,000,000, the Government does not permit of large concessions of land, and will allow the use of any given tract of land for sugar production for only one year out of three, requiring that rice be planted for the other two years. This necessitates a rotation of crops in three-year periods, and continually reserves two-thirds of the available sugar land for the production of rice. This has been found to be a very wise provision, since, even under the present system, the consumption of rice is greater than the production in Java in normal years, so that the country is somewhat dependent on the near-by rice-producing countries for imports of the staple food supply. During last year there was, in fact, considerable discussion looking toward the further restriction by Government of sugar cultivation, in order that the local rice production might be increased. This proposal was eventually abandoned, however, in view of the importance and value of the sugar crop at the present time of great world demand and consequent high prices.

The sugar-mills are for the most part large modern plants, although some of the labour-saving devices in common use in many other countries are not used owing to cheap and plentiful labour. There is now, however, a growing interest in labour-saving appliances and machinery, due to the increased cost of labour and a certain amount of labour trouble which seems to be prevalent to-day in Java as well as other parts of the world. Java sugar-growers are now, for the first time, coming to a

realisation of their rather precarious situation in depending so completely on unskilled labour.

It would appear that the time for the introduction of labour-saving machinery is rapidly approaching, and careful and systematic efforts by manufacturers in this direction should bring results during the next few years. Most of the estates are supplied with light railways, operated with small, light wagons, but many still rely largely on bullock-carts for bringing the cane to the mills and native labour in handling it. Many estates use small wagons on the light railways, either pushed by hand or drawn by bullocks, while only a few have locomotive equipment.

The transportation of cane is especially difficult in Java, because of the fact, above mentioned, that planted areas are in small plots interspersed with plots of rice paddy, so that a plantation of 2,000 acres of cane is compelled to extend its transportation system over territory of three or four times that amount of land. Figuratively speaking, a plantation of four square miles of cane, where the longest haul would be about a mile if the mill were placed in the centre of a compact tract of that size, would require a long haul of more than two miles, if only a third or fourth of the land is in cane. Actually the difference is, in many cases, considerably greater than in the above hypothetical case, since the plots are not arranged with mathematical precision. A certain plantation, for example, of approximately 4,000 acres under cultivation, must haul the cane about eight miles from some of its more distant fields. As the plots are changed from year to year, much of the light railway must be portable,

MADRAS INDUSTRIAL
SCHOLARSHIPS.

The following draft notification has been issued by the Madras Government :—

Industrial scholarships will in future be awarded by the Director of Industries to pupils learning a trade or profession in recognized industrial schools or to selected apprentices (boys or girls) serving properly arranged apprenticeships for a specified term of training in workshops or mills where provision is made for the apprentices receiving class instruction in working hours for not less than four hours per week in subjects calculated to improve their value as artisans or operatives on completion of their training. The aim of these scholarships is to encourage deserving apprentices and pupils to complete their

whole apprenticeship or period of training at one institution or workshop and so to some extent check the present tendency of apprentices to move from workshop to workshop in search of a few annas increase in wages to the detriment of their training and the annoyance of their employers.

2. For the present, sixty scholarships will be awarded per annum tenable in approved schools or workshops or mills for a period of five years or such shorter term of apprenticeship as may be usual in the particular trade or occupation.

The scholarships will be of the value of—

Rs. 1-8 per month during the first year of training.

„ 2	„	second	„
„ 3	„	third	„
„ 5	„	fourth	„
„ 7-8	„	fifth	„

A bonus equivalent to two months overage scholarship will be granted for each year of training to such of the apprentices as satisfactorily complete the whole period of training agreed on at the commencement of the scholarship.

The conditions of award will be as follows:—

- (1) All scholarship-holders shall be on probation for six months, after which the scholarship will be confirmed or withdrawn after consideration of a report from the employer or teacher regarding the scholar's work. Scholarships will ordinarily be granted to members of the artisan castes or to others whose families are already in the trade.
- (2) No scholarship will be granted to candidates who are over seventeen years of age at the commencement of their apprenticeships, but in the case of Muhammedan candidates, the age limit may be raised by two years.
- (3) The general educational attainments of candidates should be such as would enable them to profit by the training provided. Ordinarily a standard V pass in the primary grade will be regarded as the absolute minimum, but the nature of the trade to be followed, the pecuniary circumstances of the candidate, and his general fitness for the work will be taken into account in deciding whether a candidate is qualified for the scholarship.
- (4) The candidate and his guardians must enter into an agreement with the employer that he will faithfully fulfil the conditions of

apprenticeship, and unless prevented by sickness or other circumstances beyond his control, serve the full term of apprenticeship that may be agreed on.

GENERAL REGULATIONS.

3. Applications for scholarships should be submitted by the head of the institution in which a candidate is studying or intends to study or by the candidate's employer or his manager on or before the 15th April in each year. Applications should be accompanied by a 'clearance' certificate from the school last attended and by such other particulars as are likely to assist the Director in coming to a decision, and should be made on forms which may be obtained from his office.

4. The names of selected candidates will be notified by the Director of Industries in the *Fort St. George Gazette*. Each scholarship will come into force on the 1st July.

5. Any scholarship withdrawn during the period for which it is tenable may be awarded with the consent of the Director of Industries for the remaining period to any eligible applicant.

6. Heads of institutions and employers may grant leave for a period not exceeding one month to scholars who are absent in consequence of severe sickness; but if the leave exceeds this period, no scholarship will be granted for the period exceeding one month. Casual leave may be granted for good and sufficient reasons for a period not exceeding fifteen days in the year. If a scholarship-holder absents himself without good reason on the reopening day after the vacation or holidays, the scholarships for the vacation or holidays is liable to be withheld by the Director of Industries.

7. No person receiving a scholarship under this notification will be permitted to hold another scholarship, provided wholly or partially by Government, without the special sanction of the Director of Industries.

8. All scholarships are liable to forfeiture for idleness, misconduct, irregularity in attendance or failure to make due progress or to secure annual promotion.

9. A scholarship held in any class or year of apprenticeship shall run from the beginning of the month in which the holder joins the class and shall not be drawn after he ceases to attend the class or leaves the workshop. The scholarships are payable monthly.

10. In all cases where poverty has been made a condition of award, applications will be summarily rejected unless there is evidence to show that but for

a scholarship, the applicant will not be able to continue his studies.

11. In addition to any register maintained under rule 60 of the Madras Educational Rules an acquittance roll containing the following information shall be maintained by the heads of the institutions or employers concerned and should be produced at the time of any departmental inspection of the institution, or workshop or mill :—

(1) Number; (2) name of scholarship-holder; (3) standard of scholarship; (4) monthly value of the scholarship; (5) period tenable; (6) number and date of the order in which the scholarship was sanctioned; (7) month for which the scholarship bill was drawn; (8) date of the encashment of the bill; (9) date of disbursement of the scholarship money and amount; (10) signature of the scholarship-holder; and (11) remarks.

12. Government trust that employers of labour will co-operate with Government in this scheme to the extent of conducting recognized classes in their works during working hours or allow their apprentices time off duty to attend classes in the Madras Trades School or any other place where suitable training is provided.

13. Work schools and classes will be eligible for recognition and for a Government grant provided they are conducted to the satisfaction of the Director of Industries, irrespective of the number of scholarship-holders in attendance.

FINANCE.

World's Monetary Situation.

A very able survey of the financial and economic problems with which belligerent and neutral nations alike find themselves confronted in varying degrees as the result of conditions arising out of the war is given by Professor Cassel in his "Memorandum on the World's Monetary Problems." Its outstanding merit is, the *Near East* says, its absolute directness. Professor Cassel is nothing if not concise, and in the plainest of terms he sets forth the problem that the nations have to solve for their well being, disposing on the way of the numerous fallacies regarding high prices, the exchanges and other matters

that have been allowed to interfere with clear thinking on this vital subject, and then explains the path that it seems to him must be pursued if the disease is to be remedied. He does not cover new ground in his suggestions; the expedients he advises are those which have obtained general acceptance among economists and financiers, but those who expected novelty can scarcely fail to be convinced by his closely reasoned presentation of the case.

HIGH OR LOW EXCHANGES IMMATERIAL.

What he says in regard to trade and the exchanges is of special interest. The restrictions on trade that have been introduced by various countries come in for strong condemnation. The prohibition of exports, the licensing or rationing of exports, measures to keep up higher prices for foreigners than for the home market, are examples of methods, it is pointed out, which all work in the direction of a corresponding depression of the international value of the currency of the country applying them. There are, of course, exceptions to the rule, as for example the restrictions of the import of luxuries which obviously must have an enhancing effect on the international value of a currency.

It needs no emphasis that any deviation from the purchasing power parity of the exchange between two countries must adversely affect trade, but Professor Cassel lays stress on the point that as soon as this parity has been established it is immaterial whether the level is high or low. "Thus, the export trade of a country is not hampered by low quotations of the foreign exchanges as long as these quotations only correspond to a high level of prices in foreign countries or a low level at home; nor is it especially stimulated by high quotations of the foreign exchanges as long as these only correspond to the relative purchasing power of the monetary standards quoted. Likewise, low prices on foreign currencies do not mean an encouragement of imports from them or a handicap for the home producer, provided these exchanges are a true expression for the purchasing power of the foreign money; on the same condition, high prices of foreign currencies do not in any way hamper the import from them. In fact, the terms 'high,' or 'low' exchanges have no sense in themselves; if they are to be used they must obviously refer to the normal rates of exchange *i.e.*, to the purchasing power parities. But when used, as is generally the case, in reference to old parities which have lost all real significance, they are in the highest degree misleading."

NEW PARITIES.

The temptation to regard the exchanges from the light of the pre-war parities is inevitable and natural, but it is, Professor Cassel points out a grave mistake as the result is that people often represent an exchange as being against a country when the opposite is the case, and *vice-versa*. The world, he says, will never come back to the pre-war parities, and sooner or later people will have to accustom themselves to look upon the new purchasing power parities which will in due course be evolved as the true parities. In commercial circles here, this view has long obtained, but it is not so abroad, where the parity to sterling, given that sterling itself is at par, is still looked upon not as an ideal, but as a readily realisable project. Obviously, the maintenance of this belief means the hampering of trade until it is understood that the parity to be looked forward to is the purchasing power parity, and not a parity which represents conditions that cannot be reproduced.

The exchanges are based on a country's internal financial position, and an improvement of a country's exchange can only be brought about by enhancing the internal value of its monetary unit; and to do that, Professor Cassel points out, a country must succeed in reducing its inflation. That is the way to the world's financial reconstruction, whether one considers the problem of the exchanges or any other aspect of the complicated situation. As Professor Cassel expresses it, "As long as inflation is allowed to go on, deteriorating still further the monetary standards, there is no hope for any work of reconstruction." Eighteen months have passed since the Armistice, but there has been so far no serious attempt to tackle the problem of inflation; on the contrary, by one means or another (perhaps unconsciously in the case of subsidies, etc.), the opposite policy has been pursued, and the problem that has now to be grappled with is far more serious than it was on November 11, 1918.

EVILS OF INFLATION.

The result of the continuance of inflation is that as the supply of available money can be arbitrarily increased, opportunities for its utilisation automatically increase, labour wants more wages, prices are increased, and the vicious circle is established. "In one word," says Professor Cassel, "we shall have all the factors moving which people generally look upon as the real causes of a general rise of prices. The deficiency of the popular explanations is plain enough: these factors are *always* at work as tendencies; but they are, normally, kept within due limits by a definite scarcity of money, imposing the hard necessity of restriction." The restoration of the scarcity of money is the only way, he points out, of combating

the enhancement of prices and the rising cost of living.

The stabilisation of the monetary standard depends on a limitation of the supply of money, and can be achieved only by the imposition of severe restrictions alike on the business community and on the demands of Governments for money. These demands have obviously been the chief factor in the inflation that has taken place during the war, and has been going on to a greater or lesser degree since the Armistice. Professor Cassel urges that as soon as possible there must be a complete end to attempt to reduce the prices of commodities or services by means of subsidies. The withdrawal of the subsidies will obviously mean an increase in prices, the consumer's purchasing capacity will be decreased, and the tendency will be to the depression of other prices. In other words, the movement towards the restabilisation of internal values will have set in, and as soon as that process has been successfully accomplished the stabilisation of the exchanges will also have been achieved.

While inflation must be ended as the first step in financial and economic reconstruction, Professor Cassel does not view the idea of deflation with favour except in certain cases. A deflation within definite limits is possible, he points out, in the case of this country, where a reduction in the general level of prices by about 20 per cent would probably be sufficient to establish the parity between the paper pound sterling and the gold sovereign, and therefore also to bring up the dollar exchange value of the pound sterling to its old parity. But it is emphasised that in other cases this aim is undesirable as the effect on industry would be seriously out of proportion to what would be achieved.

APICULTURE.

Bee-keeping.

We take the following interesting article by Mr. Lakhan from the proceedings of the *Agricultural Society of Trinidad and Tobacco* (Vol. XX. Part 2.)

Bee-keeping or Apiculture is a most interesting and paying industry, it has proved quite a success in some of the other West Indian Islands, viz:—Jamaica, Cuba, Grenada and Hayti. In Trinidad the industry is just in its infancy but if it is taken up in the right way, according to *Modern Methods* (which I shall explain and show when I come to demonstrate) and considering how well we are situated the island could be made to yield its share of

honey and bees-wax. The peasantry and others interested must be taught the right way; those persons who have travelled about the country districts must have seen kerosene boxes and even barrels in which bees have been dumped. The better part of these are exposed to the bee-moth which is a natural enemy of the bees, which would easily take hold of the situation, destroy and be a source of annoyance to other bee-keepers who are running on modern lines, so from the very start I would urge that bee-keeping be taken up according to *Modern Methods*.

THE TERM BEES.

There are different races of bees, viz:—Caucasians, Cyprians, Italians, Holy Land Bees. The native bees of Trinidad are Black Bees, etc. The one I would like to tell you about this afternoon is known as "Italians." They have proved without doubt the best all round. The home of these bees, as the name suggests, would be Italy; between the years 1855-1858, some were taken over to America and to other parts of the world for honey-making, gathering, prolificness of the queens—being able to fight against diseases and enemies they are unsurpassed; they are also known under different heads as:—Three Banded, 5 banded, leather coloured, Goldens, etc.

In Trinidad we have the Italians, and in many cases we have crosses known as Hybrids—some of the latter are good honey gatherers, but not easily managed, so all up-to-date bee-keepers try and rear as pure a stock as possible.

CLIMATE.

Before I come to the hives and its inmates I must touch on the climate and flora of Trinidad. Climate plays a very important part in bee keeping; if we were to compare the climate of Italy and the United States with that of Trinidad we would find that the two countries above referred to are situated in the North Temperate Zone and enjoy about the same climate. Apiculture has proved quite a success in these two countries and especially so in the United States. The wintering of the bees, that is putting them up in cellars during the season, forms a most important part of the work in these Temperate Climes—the bees have to be fed, getting them ready for the Spring the queens would stop laying, and work is more or less at a standstill; but it is not so in Trinidad (West Indies) where the climate is tropical. The queen lays throughout the year, she may slack down a *little* during the rainy season. A bee-keeper coming from the North would have to learn conditions anew, so as to be successful and vice versa. Bee-keeping in the tropics is simpler and less expensive than in the North.

BEE-KEEPING AND ITS RELATION TO AGRICULTURE.

Having touched on climate, I come to this question. What has bee-keeping to do with Agriculture? This would lead us to study the process of Pollination. Space would not allow me to go into it, as it forms a very intricate and interesting study by itself but we have seen birds, butterflies and other insects flitting from flower to flower. These visitors go about the flowers to get at the *Nectar*. They come in contact with the Pollen and many flowers are thus pollinated. The more pollinated the more fertilised and therefore the larger the crops.

Farmers and fruit growers in the United States of America and Canada have realized the importance of the honey bee and the great part they play in the pollinating of flowers. Bee-men have been offered as much as \$5.00 to \$6.00 (per colony) just to keep their bees on certain estates during fruit bloom.

The Usine St. Madeleine Company have realized this importance and are keeping bees on their coconut estate at Plein Palais.

THE FLORA OF TRINIDAD FROM THE BEE-KEEPERS' POINT OF VIEW.

But we must not go away with the idea that all flowers yield nectar and we can conveniently divide the flowers of Trinidad into four sections.

- 1st.—Those grown for ornamental purposes as the Rose, Corellila, Dahlia, Holly-hocks, etc., etc.
- 2nd.—Those from which we get fruits, as oranges, and other citrus fruits, Mangos, Guava, Coconuts.
- 3rd.—Those used as vegetables, as Corn and the pea family, viz. the pigeon and black-eyed beans.
- 4th.—The forest trees, as the Hog Plum, Gigge, wood, Sage, Mangrove, etc., etc.

Now the first group known as the ornamental group is of very little (importance) value to the bee-keeper, very few producing nectar or pollen.

The 2nd, 3rd and 4th groups are the most important. The quality of the honey would very much depend upon the location. There would be a new era in bee-keeping if there was a large citrus fruit industry in Trinidad.

LOCALITY AND MANAGEMENT.

As locality and management are the two chief factors in bee-keeping I have done some travelling and have studied the situation. We can conveniently divide the island into five sections, the first three according to the three Mountain Ranges, viz:—(1) the Northern, (2) Middle and (3) Southern, (4) The Cocal along the shores where coconuts are grown, where we may also find the Mangrove, (5) Down

South, along Debe and Penal where the Black-eyed bean is largely grown. If the Apiarist would locate under the foot of these hills, he would be able to harvest very large crops (for there is quite a mixture of forage for the bees).

Between these ranges there are acres of Rice and Cane lands in the flats, No forage for bees, therefore the best place to locate large apiaries. If the industry is started in earnest, we have to guard against overcrowding.

THE HIVE AND ITS INMATES.

Now in coming nearer home, let us study the Hive and its Inmates. The natural home of the honey-bee or any other bee would be in some hollow tree; according to Modern Methods, bee-keeping has been made very simple and especially since the Americans have gone into the business so extensively, for to them, very much of the success of our modern bee-keepers are due, and due recognition must be given to this fact. Bees are put up in hives known as their homes, the industry has been made so simple that the handling of a hive may be likened to the leaves of a book. A modern hive is divided into two parts. The lower part known as the Broad Chamber, and the one above as the Super. The frames, ten to each part (standard hives), are imbedded with comb-wax, known as foundation, and are placed in the hive and the bees work on them. Bees draw out their own foundation or wax, but it is far better to give them foundation, and this brings me to what I may term a "trick of the trade." It takes about 12 lb. of honey to make one pound of wax, the bee would have to digest this large amount of honey, and convert it into wax, while if wax was given them, they would store that amount of honey for the Apiarist. Another point which the good bee-keeper guards against is this:—When bees are left to themselves they build a large number of drone cells. Now a hive having a large number of drones would in a short space of time be unprofitable to the bee-keeper. Man has been so ingenious that he prevents this state of affairs to a large extent by giving combs with worker cells, the more workers the more honey stored, therefore the crops are larger.

The inmates of a Modern Standard Hive are:—One Queen, from 50 to 60 thousand workers, and one or two hundred drones.

The queen as the name suggests is the centre of attraction; on her depends the life of the colony and she receives the best attention from the workers; if she is removed, they put up a piteous cry, showing great distress; if she is not promptly returned they would start to rear a new queen.

THE GROWTH OF BEES.

Gentlemen, for you to understand this I must explain how bees grow. We take for granted that the queen is continually laying—may be from 2,000 to 3,000 eggs a day in these hexagonal cells. In about three days the eggs are hatched and then we have a larva, or grub; these are fed by the nurse-bees, (with bee-bread, a mixture of Pollen and honey); after a time they pass on to the pupa stage, and in the case of workers, we have them in 21 days. In case they want to rear a queen these same larvæ are lavishly fed not with bee-bread but with a jelly-looking stuff, known as Royal Jelly. These cells grow much larger like peanuts: they pass through the pupa stage and in about 16 days after the eggs were laid we have a queen. 25 days are necessary for drones. A few days after the birth of a queen she goes on her wedding flight, she is mated with the first drone meeting her on the wing. If the drone is from an inferior stock and a hybrid her progeny would very much be the same.

QUEEN, WORKERS AND DRONES.

Care must be taken that the drones round and about the mating yard and even those in other yards near by should be of a pure stock. The chances of getting pure-bred bees are very poor, for queens have been known to go four and five miles to be mated. She is mated once in her life, the drone dies, she returns to her hive and starts on her life's work—that of laying. She may live 4 or 5 years, but to get the best results, I would advise "requeening" every year. The workers as the name suggests are again subdivided into "Field Workers, Nurse Bees, Sentinels, Attendants, Soldiers, etc. They start from early morning to late in the evening working, bringing in Pollen (which is absolutely necessary in brood rearing) and honey, which they feed on and put up in store or surplus. Its life is very short, one month to 1½ months.

The drone's chief purpose is to husband the queen; he does not gather honey nor has he a sting, he can use up a large amount of honey. So the bee-keeper has to see that he does not rear too many drones.

Now having our bees in good shape we get ready for the crop, which really starts in December and ends in March; very much would depend upon the locality, but the dry months are the honey months for the best honey is then secured. We get a little in between the other months, but of an inferior quality. An average hive would easily yield 8 gallons or 100 lb. for a season, and from 1 to 2 lb. of bees wax. Now for a whole year a hive could easily be made to give bee-products valuing \$20.00; the profits are large when well managed.

I have not touched on swarming, because another six pages would be needed, but a paper on bee-keeping would not be complete without it.

The natural way in which they divide themselves and form new colonies is by means of swarms.

Nature provides this; otherwise the race would be extinct. The good bee-keeper prevents this as much as possible, except when he wants to increase his colony, but in Modern bee-keeping the bee-keeper can increase his number of colonies by the "Dividing Plan."

BOOKS IN BRIEF.

Introduction to Economics. By J. R. Turner, Ph.D. Professor of Economics and Dean of Washington Square College, New York University—George Allen and Unwin Ltd., Ruskin House, Museum Street, London, W. C.—Price 15sh. net.

This is eminently a book introductory to the serious study of Economics. Professor Turner terms it correctly "an outgrowth of class room discussions." He thereby disarms completely, in our opinion, all unnecessary criticism as regards its scope and the method of treatment pursued by him. Professor Turner does not desire his book to take the place of the many existing treatises on Economics: he would be glad if his work leads readers to them. We think his book possesses sufficient merit to achieve this aim. The statement of general principles in it is clear and the avoidance of loose generalities and controversial entanglements is to be highly commended. We would be glad to see the book receive attention in India, where the study of Economics ought to become more popular, if the country is to achieve that progress in the industrial field that is so much desired and desirable. We would add that for the benefit of students Professor Turner has added a set of questions, which are calculated to stimulate independent thought.

Agricultural Insurance.—By J. S. Chakravarti, M.A., F.R.A.S., etc. Superintendent, Government Press, Bangalore, 4-12-0.

Many of the chapters which go to make up this work appeared originally in this *Journal* and the attention they received at the time has, we are glad to note, led to their re-publication in the present form. As Mr. Mackenna said at the Bangalore Session of the Indian Science Congress, Mr. Chakravarti's suggestions are not only striking but also original. Mr. Chakravarti has brought to bear on his work much valuable thought and long experience gained in working the Life Insurance system in vogue in this State. We should be glad if his views will lead to some practical action being taken in the matter of agricultural insurance. The suggestions put forward by Mr. Chakravarti are thoroughly practical and deserve to be taken up earnestly by those interested in the well being of the agriculturists of this country.

A Note-Book of Agricultural Facts and Figures.—By R. C. Wood, M.A., Madras Agricultural Department, Third Edition. Superintendent, Government Press, Madras., Price 1 Rupee.

The popularity this book of facts and figures has attained is evidenced by the fact that this is the third edition issued of it. In a short preface Mr. Wood says that this has been due to the fact that the man in the street takes increased interest in agriculture. This is, we think, true and is well within our own experience. Mr. Wood deserves thanks for the pains he has bestowed on his little but useful book. It teems with valuable information. For the price of one rupee, the most up-to-date scientific information of practical value is available in this book. Mr. Cecil Fisher of the Indian Forest Service has contributed notes on timber trees in the Madras Presidency and these make the book even more encyclopaedic for the real agriculturist. We have no doubt that the book will find a larger circulation. A book for Mysore on these lines would be a welcome addition.

Sir J. C. Bose, His Life and Speeches.—Published by Ganesh & Co., Madras. Price Rs. 2.

This is a timely publication, in view of Professor Bose's election to the Royal Society. Its interest to us is in the fact that it brings together in brief compass all the more notable utterances of the gifted Indian scientist. The life which precedes them is a short but comprehensive one. The book deserves a wide circulation, and we have no doubt it will have it.

Writing of Mr. Ainscough's paper read before the Royal Society of Arts the *Statist* says:—The opinion which we expressed last week, that the present trade and financial depression in India would right itself very soon, is corroborated in an exhaustive paper read yesterday afternoon before the Royal Society of Arts by Mr. T. M. Ainscough, O. B. E., H. M., Senior Trade Commissioner in India and Ceylon. The reader, who has had an excellent opportunity of studying first-hand the interesting developments which have taken place in British India during and since the War, describes in detail the charges since 1914, dwelling at greater length on the events which have led to the present rather serious position. As is well known, there is something in the nature of a congestion of commodities in Indian as well as in most Eastern markets on account of a diminished buying power on the part of the population, and the credit resources of Eastern banks are, in consequence, severely strained. The situation has been aggravated by the rather disappointing monsoon and the recent slump in the value of the rupee, following the withdrawal of Government support. Despite these factors, Mr. Ainscough is optimistic about the situation, and while strongly, emphasising the need for caution on the part of those engaged in the Indian trade, expresses the opinion that the present abnormal position will be cleared in a few months. His opinion is supported by the recent rally in rupee quotations as well as by the fact that Indian houses have quite recently shown signs of renewing their orders for Manchester cotton goods.

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DEVELOPMENT OF THE RESOURCES OF MYSORE STATE.

BY SIRDAR M. KANTARAJ URS,
C.S.I., B.A.,

Dewan of Mysore.

[*Concluding his address to the Mysore Representative Assembly, which opened on 25th Oct. 1920, at Mysore, Sirdar M. Kantaraj Urs said as follows :—*]

The State is fortunate in possessing a most carefully elaborated system of irrigation by tanks, the capitalised value of which is estimated at over 7 crores of rupees. But no satisfactory methods have yet been devised to maintain this valuable property in an efficient condition. By the ancient custom of the country, it is the duty of raiyats holding lands under irrigation tanks to maintain them in an efficient condition, and although the obligation has not been questioned, it has never been satisfactorily discharged. In 1866, the late Mr. Bowring, then Chief Commissioner, said : "Of late years, the raiyats have silently ignored their obligations and the whole duty and cost of repairing tanks both in regard to the requisite labour and material have fallen on Government." But it was manifestly impossible for Government to undertake the petty annual repairs of over 26,000 tanks scattered all over the State, and the raiyats' liability was re-imposed by the

issue of rules in 1873, which are practically in force to-day. There has, however, been great difficulty in enforcing them, owing to the decline of the communal spirit, the absenteeism of landlords and the absence of any penalty for non-performance. Various methods have been tried in recent years, either by way of commuting the liability by the imposition of an acreage cess or of attempting to revive the communal spirit by the formation of village statutory bodies under the Tank Panchayat Regulation. None of the measures have proved successful so far. Government have endeavoured during the year to provide a solution, the chief features of which are the contribution by Government of the cost of half the repairs by remission of the Irrigation Cess to the villages that discharge this duty satisfactorily, the imposition of a penalty equivalent to double the cost of maintenance in the case of defaulting raiyats, and the delegation of this duty to Village Improvement Committees wherever Tank Panchayats have not been formed. I would earnestly request the members of this Assembly to afford their full and hearty co-operation in giving a trial to the rules now framed ; for, I am sure, you recognise that the agricultural prosperity of our State greatly depends on the careful preservation of its invaluable irrigation assets.

INDIAN INSTITUTE OF SCIENCE.

The report of the Chemical Services Committee proves the urgent importance of establishing Chemical Research Institutes if

Government should desire to promote industrial enterprise under our present conditions in India. The Committee recommend the constitution of an All-India Chemical Service and the establishment of Research Institutes under provincial control in various parts of the country together with an Imperial Institute with advisory functions under the Government of India. The governing body of the Indian Institute of Science has also come to the conclusion that a change in the main object with which it was originally established, namely, that of providing a post-graduate University training, is called for by the present trend of conditions in India. Government are naturally keenly interested in these questions and have under their consideration the changes in their relations with the Indian Institute of Science which they will submit for the decision of the Government of India when the question of the future constitution of the Institute comes up before them for consideration. •

FINANCIAL FACILITIES TO TRADE AND INDUSTRY.

(a) *The Bank of Mysore*.—During the early part of this year the Government appointed a committee, presided over by the First Member of Council, to consider and report the directions in which the work of the Bank of Mysore may be improved. Since its establishment seven years ago, the Bank has made steady progress but the resources at its disposal are not adequate for meeting the growing demands of business and a large portion of the trade of the State is still untouched. There was also a gradual decrease in the ratio of capital and reserve to deposits which were expanding rapidly, and no action had been taken in regard to the transfer of Treasury work to the Bank as contemplated at the time of its establishment. Government have recently passed orders on the recommendations of the committee. The policy that dictated the establishment by Government aid of a private banking institution

in the State has been abundantly vindicated in the signal assistance which the Bank of Mysore has rendered in the floatation of the recent loan, and Government expect that, after the measures now sanctioned are brought into force, the Bank will gain in prestige and financial standing and will be of even greater assistance in developing the resources of the State.

(b) *The Co-operative Movement*.—Government have recently announced the appointment of a committee on Co-operation. The Co-operative movement has caught on in Mysore quite as effectually as in other parts of India so that we have at present 1,400 societies serving 92,600 members with a working capital of Rs. 78 lakhs. But there are certain unsatisfactory features about it which the Government would be glad to have examined by an expert committee. The movement has not thriven in the Malnad part of the State which is probably in greater need of an agency for cheap credit than the Maidan and associations for other than credit purposes have hardly succeeded anywhere. Even in regard to the work done in the field of credit it was revealed in an investigation of the affairs of 350 societies that the financial indebtedness of the members had undergone no change except that half of it was transferred from the sowcar to the society and that their assets had increased by 16 per cent, Government have been fortunate in securing as Chairman of the committee one of the well known members of the Committee on Co-operation appointed by the Government of India a few years ago.

INCREASING THE EFFICIENCY OF THE PEOPLE.

I have already explained that the educational measures the Government propose to adopt with a view to increase the efficiency of the people will be dealt with in the order on the Educational Memorandum which will soon be published and I have also dealt with the revision in the constitution of the Malnad

Improvement Committee in order to ensure due attention to the problems presented by that part of the State. The only other matters to which a brief allusion may be made under this head are (1) the amelioration of the condition of the depressed classes, and (2) the problems of City Improvement.

The Depressed Classes.—The question of improving the condition of the depressed classes was very ably discussed at the Birthday Session of the Representative Assembly and also at one of the meetings of the Economic Development Board. As you will easily recognise, the question is not free from difficulties. There is no doubt that some sort of State action is called for as the depressed classes, in their present condition, are incapable of self-help and it is impossible to expect any private agency to co-ordinate the work of a number of Government departments whose active sympathy and support are essential, if any real improvement is to be effected in their condition. But it will not do to minimise the danger of unsettling the minds of a large community and withdrawing its members from the work they are now accustomed to without, at the same time, providing them with avenues of employment suited to their roused aspirations. In any case, the problem of ameliorating the condition of nearly one-sixth of our population at present sunk in poverty and ignorance is far too stupendous a task to be tackled even by a Government agency however well-equipped. The question as to the best lines on which this might be attempted has recently been referred to a committee whose report will be earnestly awaited by Government.

PROBLEMS OF CITY IMPROVEMENT.

(a) *In Bangalore.*—Government have reviewed in detail the work done in connection with the city improvement in Bangalore since the constitution of the first Improvement Committee in 1889. A sum of over Rs. 52 lakhs has been spent in Bangalore in

providing the city with drinking water, electric lighting, in measures relating to drainage and in laying out its extensions. New problems have arisen with the advent of new conditions consequent on the growth of the city in size, population and importance. Government have indicated the new improvements urgently needed which are estimated to cost about Rs. 13 lakhs to finance which a grant of Rs. 3 lakhs per annum has been sanctioned. The Improvement Committee has been re-constituted in order to carry out this programme. The city has never been provided with a proper drainage system. A comprehensive scheme, capable of being taken up in sections and estimated to cost in the aggregate about 18½ lakhs of rupees, has been prepared. Government have promised to pay half the cost of the scheme provided the balance required is found by the Municipal Council. The entire system of water-supply, which was laid out over 25 years ago, requires renovation and extension. An expert committee has been appointed to go into the whole question and submit a report.

(b) *In Mysore.*—The improvement of the Mysore City commenced with the establishment of a Special Sanitary Division under the late Mr. Standish Lee in 1892. A sum of Rs. 52 lakhs has also been spent in Mysore up to date in the acquisition of properties in congested areas, in sewerage and drainage works, laying out of extensions, water-supply and model house building. Still, it cannot be said that the sanitary condition of the capital city is all that can be desired. The sewerage and drainage works are not yet complete and sufficient attention has not been paid to house connection. All the population displaced in consequence of the acquisition of properties has not been provided with houses. The construction of new houses in order to avoid over-crowding is an urgent necessity. The further improvements required are divided into the classes, productive and non-productive, the former to be financed by means of

loans and the latter out of an annual State grant of Rs. 4½ lakhs.

With a view to enable the cities to carry out their productive works and to solve the housing problem, it is absolutely necessary that the two premier municipalities should evolve some means of raising loans from the general public. Government have indicated that they are prepared to consider any workable scheme involving a reasonable contribution from State funds to bridge the difference between the rate of interest at which they have to borrow and the rate they charge for their loans. The great example which has recently been set by Bombay is likely to be largely copied by the other leading cities in India and Government earnestly trust that the local authorities responsible for the administration of our two premier municipalities will not be slow to appeal to the civic patriotism of their moneyed classes to finance schemes of local importance.

CONCLUSION.

I have now placed before you the most salient features of the past year's administration and some of the more important questions now demanding your attention. The march of events elsewhere has begun to affect us in a manner to which we were not accustomed before the war and it is therefore of vital importance to us to organize and strengthen our social and economic fabric so as to be able to rely more and more on our own resources and be less at the mercy of these unknown factors. The violent convulsions through which society has passed in many parts of the world—though we have been fortunately free from their direct effects—the breaking up of class privileges and distinctions, and an increasing political consciousness have made the demand for equality of opportunities more and more insistent throughout the world and the problem of the advancement of the relatively backward classes without in any way affecting the progress of the community as a whole is the one that is pressing itself

for solution everywhere and is also engaging our most anxious consideration. Political reforms of a far-reaching character are in the process of introduction in British India and the whole political atmosphere is in a state of violent disturbance through various causes. These changes do not at present directly affect us, our conditions being so different. In all questions of imperial policy that may involve the interests of the State, the powers of His Highness the Maharaja to safeguard them remain unaffected. With us, there is no cleavage between official and non-official interests and there is already considerable association of the non-official element in the ordinary administration. Subject to certain limitations, imposed by the nature of our constitution, His Highness the Maharaja has been graciously pleased to give the people ample opportunities to place their views before his Government on all important legislative, fiscal and administrative measures, and to take a considerable part in the administration. It is for you to take full advantage of these opportunities, to make yourselves more and more responsible for local affairs, to strengthen the foundations of the existing assemblies and councils and qualify yourselves for an increased share in the administration. The financial situation also needs at present your earnest co-operation. The increasing demands of a progressive administration and the policy we have adopted of a large expansion in education and providing assistance to the people in the development of agriculture and industries, have made the problem one of the greatest difficulty at a time when our resources have been affected by causes over which we have no control. You will appreciate the complexity, the importance and the gravity of the various economic, social and other problems that Government are called upon to solve and I feel confident that I am not appealing in vain to your patriotism and public spirit when I ask you to co-operate in carrying out the beneficent intentions of our beloved Ruler for the advancement of his people and the improvement of the administration of his State.

SUGAR FACTORIES—A JAMAICAN EXAMPLE.

BY THE EDITOR.

IN the *Journal of Jamaica Agricultural Society*, we read of the success that has attended a sugar factory started there some time ago. The particulars given show how well the Factory has succeeded. In India, we have yet to make much headway in the matter. So the Jamaican example ought to prove of some interest. The Company in question, the Antigua Sugar Factory Company has, we are told, completed the 15 years covered by its agreement with the Government. The value of the case lies not only in its local success but in the object lesson which it should give to other places. The short facts of the scheme were as follows:

(a) The Government provided £15,000 and the company £25,000, making a total of £40,000, for the erection of a factory to make 3,000 tons of sugar in the season. The factory was duly erected, the actual cost being £45,358, approximately £15 per ton of sugar capacity. It made its first crop in 1905. It has since grown to 10,000 tons sugar capacity, and the total cost of capital account has been £103,229, or £10 6s. per ton. (b) The Government stipulated for fair co-operative terms for the original contracting planters, and that, at the end of 15 years, shares representing half the value of the factory should be made over to these. They have received high prices for their canes, the rate averaging in recent years over 9 per cent on the f.o.b. price of sugar without any deduction for cost of bags or export taxes the factory also bearing the cost of transport of canes from the estates. These terms are probably much in excess of what has been paid in any other part of the world, and these planters are now to have their shares, representing £51,615, transferred to them free

of charge. This result has come not only from their being contracting planters, but also because of their being placed in the position of shareholders in respect of the £15,000 subscribed by the Government. (c) The Government also stipulated for fair rates for canes from present growers, and these have received about double the rates previously ruling. Now that the agreement with the Government under which they worked has terminated, and there is no longer any charge on the company for interest and sinking fund for capital outlay, it is proposed to place them on a higher scale of payment for their canes. (d) The subscribers of the £25,000 have received for the whole period an average of 20 per cent annually on their capital; they have had their capital repaid in full, and they hold shares representing half the value of the factory, or £51,615, and further they have approximately £18,000 standing at their credit in the company's books. (e) Another large section of the planting community has also profited by the factory, and the factory has profited by it—namely, the owners of plantations in the surrounding districts who have joined as new contractors. These have been paid on terms which have included sharing in half profits on each year's working account. The prices for their canes have compared favourably with prices paid elsewhere, their average in recent years being equal to over 7 per cent on the f.o.b. price of sugar, the factory bearing all the charges mentioned above in paragraph "b." The results are due, in the first place, to the sound basis on which the work was planned, and then to the improvement in the quality and the increase of the quantity of the work as the years went on. In its first three years the factory took 10 tons of cane to make one ton of sugar, which was just the rate calculated on in advance. Its work steadily improved, and during the last three years it has taken less than nine tons to the ton of sugar. In the first three years the output averaged 2,737 tons, in the last three years

9,586 tons. The improvement in the work gave over 10 per cent more sugar costing nothing, and this, combined with more than trebling the quantity, changed a success into a great success.

These are the facts connected with the Jamaican Company. It shows what success awaits enterprizes of the kind in all cane producing countries. We should be glad to see similar enterprise on the part of our people. We have a government that is always willing to help us; we have an Agricultural Department, which is not only well equipped but also ready to render any aid that is requisite; and as regards land and water, we have plenty of these in our State. All that we require is the spirit of enterprize. It is hardly necessary to add that sugar is to-day a highly paying proposition and if we do not care to take advantage of the present conditions, we never will succeed as either cane growers or sugar refiners. It is to be hoped that further time will not be lost.

Dr. G. Cecchi, Consul for Italy, at the request of his Government issues the following note on the nature of the capital tax in Italy:—Under this tax all property of any kind, lands, buildings, title-deeds, bonds of State loans, shares, etc., owned in Italy by Italian or foreign subjects before January 1, 1920, are liable to the extra tax on capital established by a law passed on April 22, 1920. Properties below 50,000 lire are exempted. In addition all foreign subjects must fill up an exact and complete statement showing their properties in Italy to be presented through the Italian Consulates in the country in which they are living. The statement should be made out on a special form.

EFFICIENCY OF AGRICULTURAL LABOUR.

BY D. ANANDA RAO, B.SC.,

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IT was at the first Economic Conference held in Bombay, Dr. Mann read a paper on a similar subject in which he endeavoured to show that the agricultural labourer in this country is not as bad as he is depicted to be by several writers on Indian labour problems, and from certain experiments conducted, he argued that "the ploughman in America using his horses, is 50 per cent more efficient than the ploughman here using bullocks."

It is not my intention to question the figures quoted by Dr. Mann, nor to argue in favour of or against the efficiency of the Indian labourer. Efficiency is after all, only a relative term, and what is considered a piece of efficient work in America may not be judged equally efficient in Britain compared with its own standards or *vice versa*. My object is, taking the labourer in India for what he is worth, to elicit from those more conversant in this important problem, any information on the methods of making labour still more efficient, if it is already so. Personally I am of opinion that there is room for improvement.

In the management of a farm, the handling of labour exercises the greatest tact, skill and patience. Labour has, it is true, suffered in the past at the hands of capital in all parts of the world. India has been no exception to it. In the United Kingdom the expression, "farm hands" is quite common even to-day, and the treatment meted out in this country is not anything that would bring credit to our civilization. But times are rapidly changing, and labour is increasingly asserting its own rights. It is an open

secret that capital is bending its knees before labour even here: that the Indian labourer has not allowed the grass to grow under his feet, but is treading on the heels of his fellow labourers in other parts of the world. Such being the case, there is no other alternative for the employer of the present day than to submit to the signs of the times, and recognize the significance of the turning of the tables.

With an ever increasing labour bill, and a constant fear of labour becoming scarce, the employer should devise ways and means to retain the labour he has secured at a high price, and to maintain it at a high level of efficiency.

Compared with pre-war days, labour costs now at least twice as much. But has its efficiency increased in proportion? It could not have been for obvious reasons. On the contrary, famines, bad seasons and high prices have all quickly followed one another, which in all probability have deprived the labourer of his former strength. It may be therefore assumed that during the last four or five years labour has if at all not only not increased in efficiency, but perhaps has cost the employer far more than before. I propose to discuss the very common causes that contribute to bring down labour to a very low state of efficiency and per chance point out certain methods which might help its increase. I should like, however, to make it clear at the outset that I claim no originality for the causes or methods suggested; they are not based on any experiments, but are merely the result of observations made during my experience as an agricultural officer. I believe there are large employers of labour in agricultural operations, in planting districts, in cotton mills, in iron foundries, and various other bureaus of labour, who I hope will assist us in providing correct information, and I shall be highly flattered if this article provokes investigation and experiments which this intricate subject rightly deserves.

In the first instance agricultural labour is unable to compete fairly and squarely with other kinds of labour in regard to wages. Agricultural labour is dubbed "unskilled," while a mechanic or a mason is a "skilled" workman. Those of us who know of agricultural operations realize that good ploughing and straight drilling call for as much skill as any of those, which come under the category of "skilled" labour, and the tabooing of all agricultural operations as 'unskilled' is therefore a misnomer. Of late it has become evident that non-agricultural operations like building construction, road making, carpentry are attracting agricultural labour in the vicinity of large towns. In many localities, it is drawn to the hills for works in the plantations and there has been not a little emigration from this part of the country to Ceylon, Burma, and Malaya. With such attractions at their doors, it is not surprising that the best of them are lured away by higher wages, leaving the country with what may be called the rif raf of rural labourers for local field operations. Again, similar occupations which require no greater skill like *e.g.*, cotton ginneries withdraw large numbers of women workers who perhaps get same wages as, if not more than those that are employed in more arduous agricultural operations. Agricultural labourers have of late been taking to apprenticeships in carpentry and smithy because of the higher wages such operations bring in. It is only an economic problem which has upset the equilibrium, and the agricultural labour has indirectly at least, hit the profession which has been and will be the standby of the nation.

Demanding as it does no small amount of physical endurance, field work is uncongenial, specially to those who are not blessed with robust constitutions. It is monotonous with nothing to look forward to, but the wage it brings. It is possible to relieve the strain by change of occupation. This, however, is not the lot of an agricultural labourer. In

these circumstances inefficiency is likely to take root in all daily tasks. Owing to slack seasons in agricultural operations, the labourers do not find themselves employed throughout the year which necessitates their tiding over seasons of scarcity with what they have saved in seasons of prosperity. And this is not possible when normally the labourer gets just enough to support himself and family. Human labour is often wasted on operations which can be replaced more efficiently by mechanical means. Lifting earth in head loads to level a field instead of using a leveller with a pair of oxen is a case in point. How often is it the experience of an agricultural officer to see human labour inefficiently employed with inefficient implements, no proper supervision, tactless management, thoughtless organization, and injudicious farming.

One of the most difficult things for a farmer to employ efficiently, is his cattle. On large farms, it is perhaps even difficult to estimate correctly the exact number of pairs required for efficient working, when busy and slack seasons alternate. It is an undoubted fact that a deal of organizing capacity is required of an officer to so equip the farm that there is neither scarcity in one nor superfluity in another. The writer obtained not long ago figures relating to the actual number of cattle employed in one of the large Government farms (mixed) during one year. It was found that except during two months of the busiest season only from 50 to 60 per cent of the cattle were utilized per month throughout the year, and during the two busiest months, the number employed rose to about 82 per cent. Even granting 4 days' rest to each pair, during a month, it was calculated that 20 per cent of the cattle including those which were ill were not properly employed, or in other words, there was a wastage in cattle efficiency of about 20 per cent. It is false economy to overwork cattle as it will only tend to high depreciation; on the other hand,

underworking will doubtless swell the farmer's bills. For inefficiency in cattle labour, apart from the inherent inefficiency of the cattle themselves, the men in charge are mainly responsible. Where cattle are worked only for 6 hours a day instead of 8 hours, and where a man ploughs half an acre, when $\frac{3}{4}$ of an acre is expected of him, it is beyond doubt that we are not getting the most of our cattle. To these inefficiencies must be added other uncontrollable factors such as illness, rainy days, and slack seasons. On the whole, on mixed farms and with efficient organization, there ought to be little difficulty in keeping the cattle at work over 75 per cent of the total number of working days.

I have indicated briefly where inefficiency occurs. What then are the remedies?

It was pointed out that insufficiency of wages is a fruitful cause of inefficiency of labour. It is, however, open to question whether increase in wages would increase efficiency in proportion. This is the first consideration which needs investigation: namely, how far we can increase the wages to obtain the maximum efficiency. It is beyond doubt that Indian agricultural labour, as it exists to-day, is very much underpaid, and so long as this continues, the blame for inefficiency will be laid at the door of the employer. Given similar conditions, it is not at all unlikely that the Indian labourer will rise and compare favourably with his western brother but this remains to be proved by facts. The first principle to bear in mind in maintaining labour in efficiency is to keep him beyond penury and want. Only then can the labourer put forth his maximum effort and direct his best attention to the work. Low wages on the other hand will only tend to divert his attention to the considerations of the morrow. How much an agricultural labourer ought to get is a question depending on local conditions. One would think that by the gradual increase of wages of the permanent labour, and carefully

watching its work without creating suspicion, useful results would be obtained.

Payment in kind, instead of in money is perhaps one of the best ways in which the ordinary ryot has solved the question of inefficiency. Such wages will minimise the tendency to extravagant habits. Extra wages can be substituted by perquisites so that the employer wins the good will of his labourers. Encouragement to those who work well during sowing and harvesting seasons by promising 1 or 2 per cent of the total yield will, no doubt, help in achieving the object in view. Presents during festive occasions would stimulate the desire to work whole heartedly for the master. Slackness in work is bound to continue, as long as the labourer feels that he is working for the profit of another, and such feeling can only be counteracted by keeping the labourers, contented and happy in ways similar to those suggested above.

Supervision of labour is much neglected at the present day. Anything that directly tends to improve it will increase efficiency. A cartman who brings sand from a distant river bed, men building a fodder stack, a mason at his culvert, boys tending calves are a few examples out of many, which as at present managed, escape scrupulous supervision. It is not easy to suggest improvements, but the best cure seems to be to educate the labourer to be worthy of his hire. It is beyond the province of this paper to deal with rural education, but it is the duty of state to educate every boy, and girl in the country in such a way as to make them realise the high sense of duty in whatever calling they may find themselves in. This again largely depends on the personality of the teachers who can infuse into them lofty ideals which they themselves follow.

For the present at all events, supervision from the most senior officer down to the maistry should be rigorously exercised. It is the duty of the superior officer to see that his overseers and maistries are the pick of

men who recognize their responsibility; for, these are the men with whom rests the bulk of supervision. It may be a good plan to give special training under experienced officers before the maistries are confirmed.

Concentration of labour at particular jobs, and not the dissipating of it throughout the farm is one secret of careful supervision. To ensure efficient work it is most desirable to insist that the actual quantity of work turned out in each operation is systematically recorded. To an experienced officer this must be one of the easiest ways of checking supervision. Supervision might be minimised by giving jobs in piece work *i.e.*, by paying a cooly according to the quantity of work turned out, which will be an incentive for a larger wage than what he would get under daily system. There is no doubt a certain amount of supervision is necessary even in such operations, as the tendency would be to sacrifice quality for quantity. One of the best methods of increasing efficiency is to employ labour under share system, for by it the labourer recognises that his efforts contribute directly to the increase of his income inasmuch as he has a claim for a share in the produce. In experimental cultivation, however, this system cannot be permitted. The exact period at which a particular operation should be given to the best advantage on share calls for judgment. In the case of cotton picking, for example, a Manager who pays daily wages when the crop has fully burst, and employs them for share at the end of the season, is held in contempt by his labourers. It must always be recognized that when labourers are paid by methods other than daily wages, the special wage should be so adjusted as to be slightly higher than the daily wage, for only then can it be really attractive.

Henry W. Wolff recommends strongly the method of giving the labourers a share in the profits in the following words: "Profit sharing means that a well defined share, fixed beforehand, of the net profit resulting in an

enterprise as a whole, shall be handed over to the workmen employed, over and above their ordinary wages. The wages should be fixed to start with and should be of the ordinary level. For profit sharing is not designed as a substitute for part of them—as you place a traveller on fixed pay and on commission—but as an inducement of work of head, hand and eye *beyond* that which is paid for in the regular wage. The labourer should receive his honest pay first.” Profit sharing is therefore intended for better intelligence, greater diligence and more thought bestowed by the labourer in his master’s work. In a modified form, this system is prevalent in most parts of the country. It is suggested, that in India where the labourer is so much indebted, the extra profits he earns in the way might go to liquidate his liabilities, which he will do, only if the master takes a personal interest in him.

One of the chief causes of inefficiency in farm labour seems to be due to what I would call, a lack of personal touch. Employers of labour are prone to treat their labourers as mere human machines. Fictitious standards of efficiency in work are fixed by men who have not the practical knowledge, so that they become more taskmasters rather than guides and helpers. Personal touch begets personal sympathy, and this is only possible where the officer realises the degree of effort that each field operation such as, ploughing, digging, mowing, planting or hoeing calls for. This is where the human element comes in. The employer must realise the difficulties of the labourer, not only in his work, but even in his private life and should regard the labourer as one possessing similar flesh and blood to his. I was greatly struck with the very friendly relations that existed between the labourers and the head of a large Government Farm, in North India, which I had the privilege of visiting not long ago. The treatment accorded to his labourers there is worthy of imitation on the

part of officers of similar status in other parts of this country. The labourer in this instance would fearlessly approach his superior with his grievances, and his personality averted many a time a strike owing to silly coercion on the part of his farm staff. In the training of agricultural students, neither the student nor the teacher can afford to forget this aspect of human element, in practical work. It is the sacred duty of the teacher to constantly impress upon the student the importance of his knowing the details of practical work, for no other reason than to gauge in later years the correct estimate of a labourer’s efforts. The practical student, from his point of view, knowing the ease or difficulty of each operation, should train himself to correctly value the farm labourer. He should realise that practical work in the curriculum is the only way of training him to be a proper supervisor of his labour and of attracting for it his best respect.

A practice prevalent in Britain, which is worthy of adoption elsewhere, is the allotment of small plots of land to labourers for the cultivation of vegetables for themselves in their spare time. Free housing is an admirable method to make the labourer contented. In Coimbatore such a practice is very common in garden lands, where the chuckler employed to stitch the leather buckets, is provided with a hut for himself and his family.

A point worthy of investigation is the advisability of giving occasional rest to the labourer doing strenuous work. The writer remembers reading of some American Experiments with a similar view but has not heard of any such efforts made in India. During the first half an hour that a ploughman works, the efficiency is low owing to several defects connected with his plough, his oxen or himself. When adjusted, however, during the next hour, the efficiency is likely to be at its height, after which the efficiency decreases in proportion to the

number of hours worked, which is due to the usual human as well as animal weakness. If, however, from the time that efficiency tends to show retardation, some rest is afforded, it is worth investigating whether efficiency cannot be maintained at a higher level than if the labourer is worked in the usual way. It appeals to common sense that efficiency is bound to increase, but there are practical difficulties in the way. Unless supervision is perfect, the labourer is likely to take undue advantage of the relaxation. In the case of operations done as piece work or under share system, the labourer solves the problem himself by taking rest whenever he feels the necessity, and while engaging labourers in such operations, it would be most useful to study unnoticed, the method of relaxation and the frequency of it, that the piece worker or sharer enjoys. Closely allied to this is the periodical rest that the animal system needs in maintaining the body in health. Nature is an efficient master and revolts when bodily rest is suppressed. How often and for what length of time, such periodical rests be encouraged is a matter to be decided purely by local conditions. The rest given to the labourer must be at the expense of the employer alone. In western countries except for a brief annual holiday, the workman is compelled to lose his wages for all compulsory holidays. This, however, cannot be done in India, where wages as we have already seen are low. It is suggested that all employers should insist on their servants taking a holiday even once a fortnight at full pay, as it is indeed a short-sighted policy to make a labourer work week in and week out without any change or relaxation. Custom demands of the employers of domestic servants in England the giving of a weekly and sometimes a bi-weekly half holiday. In Government farms in this presidency, all farm labourers are given three holidays in a month which they can accumulate up to 20 days. This allows a far-sighted cooly to go off on a three weeks' annual holiday if he so desires.

It may be a good plan also to reduce or increase the hours of work according as the season is dull or heavy, instead of adopting the hard and fast rule of 8 or 9 hours a day of work. In summer when the days are hot and long, it would contribute to efficiency if labour is employed only during the cool hours of the morning and the evening, with a long break in the afternoon.

Since it is recognized on all hands that agricultural labour is monotonous, it should be one's endeavour to change the occupation as far as possible. It may not always be possible,—indeed it is not considered expedient, to change the occupation during a day, but it ought to be possible during a week. A ploughman to be made to plough day after day, is irksome both to man and beast. A change to harrowing or carting would be a welcome relief.

Competitions have their great advantage in increasing the quantity of work turned out, but must not be allowed at the expense of quality. A better method than competition seems to be an award of surprise prizes in money or kind, for good work turned out by the labourer without previous intimation. This will create a healthy rivalry among labourers tending to keep efficiency always at a high water mark.

It is very unfortunate that human nature likes to keep people below ourselves, in the same level at which we found them. I would think that discouragement and dissatisfaction at their own state are the root causes of a good deal of inefficiency among labourers. Such employers who would encourage and help to lift their labourers from their serfdom to those of independent landed proprietors are considered real benefactors to the nation.

The writer has endeavoured to briefly record what he had learnt from his experience. He is aware that there are many whose experience is much more mature and varied, who he hopes will throw more light on this problem. That practically little or no investigation has been made up to the present is evident and it is a pity that a problem of such importance is treated so scantily even by workers in improved agriculture.

CO-OPERATION IN BIHAR AND ORISSA, 1918-19.

BY "RUSTICUS."

THE last Report of Khan Bahadur Mohi-ud-din Ahmad, the Registrar of Co-operative Societies in Bihar and Orissa, is one of the most interesting we have read. The Khan Bahadur is an enthusiastic believer in the future of co-operation in his province but he does not gloss over the weak points in the movement. He is on the spot and should know best but many of his readers will wonder whether he is not unduly optimistic. They need not go farther than page 4 of the report to find facts in support of their view. The Provincial Bank has a sum of nearly Rs. 4 lakhs on fixed deposit. Of this, Biharis have contributed Rs. 20,000 only. The Madhipura Central Bank has deposits of Rs. 83,000 of which "true sons of Bihar" have contributed Rs. 37, the rest being from Bengalees and Europeans. Again, with hardly an exception, it would seem that nothing would have been done in the new areas which were opened up during the year had it not been for official assistance. It is in every way most desirable that District Officers should take the keenest interest in co-operation. There is no way better calculated to bring them into touch with the soul of the people. But it is not as it should be that so much of the initiative in starting co-operative institutions should rest with them.

In 1918-19, the number of societies in Bihar and Orissa increased by 468 to 2,169. The number of members rose to 83,029, an increase of 8,158, and the working capital to nearly Rs. 65 lakhs, an increase of rather more than 10 lakhs. All but 150 of the societies are agricultural societies. 1918 was a bad year agriculturally for Bihar and the Registrar considers that, in the circumstances, a collection of 52 per cent of the demand

of the agricultural societies which was the same figure as in the preceding year was extremely satisfactory. He adds that even this percentage was only possible on account of the very high prices obtained by members of societies in areas in which the crops did not fail altogether. We are unable to share his satisfaction. If year after year, societies are only able to realize about half their dues, they will soon find themselves bankrupt. But it would not be fair to pass too severe a criticism on the results obtained in what was undoubtedly a bad year and we shall await with interest the Report for 1919-20 which was *not* a bad year and shall then be in a position to judge whether the movement in Bihar is inherently sound. There is certainly one point which must be accounted to the Registrar for righteousness. Loans for which extensions have been granted are not excluded from the amount shown as overdue. As Mr. Mohi-ud-din Ahmad says, this procedure gives a better idea of the actual inability of the societies to pay on the due dates and leads to closer scrutiny of the causes why loans are not repaid. But technically speaking, loans for which extensions have been granted are not overdue and had the Registrar been given to the pernicious practice of "window dressing", he would have excluded them.

Before leaving agricultural co-operation, mention should be made of the loss co-operation in Bihar and Orissa has sustained by the death of Father Molhant of the Catholic Mission at Ranchi. The Catholic Mission Society which he founded is stated by the Registrar to be the largest co-operative society in India. This may be true of its membership which is nearly 12,000 but is not true of its operations. It has a working capital of Rs. 4.3 lakhs which is only about one quarter of that of the G. I. P. Railway Employees' Society in Bombay. This, however, is merely by the way and in no way detracts from the excellence of Father Molhant's work. His society rendered most

valuable assistance in recruiting men for labour corps and he kept a paternal eye both on those who went and those who were left behind. Those who went received only a small part of their pay, the balance being banked for them until they returned. When they came back, most of them found that they had enough to redeem their mortgaged holdings and to free them from debts. Many of them were able to purchase more land and cattle. A tribute to Father Molhant's memory might well have been included in the Local Government's review of the Report. If there were more co-operators like him, the problem of the indebtedness of the Indian peasantry would be in a fair way to solution.

The number of non-agricultural credit societies increased from 41 to 61 of which 25 are for Government servants. The best of these is the Secretariat Co-operative Society which has 398 members and a working capital of Rs. 45,000. There is a very human touch in this section of the Report. In referring to the work of the Provincial Civil Service Co-operative Association, Khan Bahadur Mohi-ud-din Ahmad mentions that the Provident Fund contribution amounts to Rs. 5,450 and that deposits are not coming in. He adds, evidently from the depths of his own bitter experience as a member of the Service for whose benefit the society was formed that this is not to be wondered at as very few officers are able to save anything.

There can be no doubt, that, as time goes on, the test of the progress of the co-operative movement in India which will be increasingly applied will be the progress in what are now lumped together as other forms of co-operation. It is a test which, if applied at present would give most disappointing results. Bihar and Orissa is not the worst province in this respect but that is all that can be said. The number of stores increased from 6 to 12. The increase was due to the prevailing high prices but the Registrar adds that he does not know if the stores have

succeeded in creating much enthusiasm amongst their members as their successful management is by no means easy. That is the crux. The honorary worker or even the paid manager has to compete against the shrewd bania or marwari who has spent a lifetime in close touch with the market and knows exactly when and where to buy. However the Secretariat Stores are prospering and are erecting a house of their own at Patna at a cost of Rs. 6,000.

As our readers are aware, we are not hopeful of the efforts the Co-operative Department is making to improve the lot of the weavers. In our view it is merely bolstering up a dying industry. It is true that its death will be lingering and that for a long time to come the conservatism of large sections of the Indian population will preserve a market for the products of hand looms. We need hardly add that we should be very glad if one gloomy ratiocination on this point were falsified. There are 19 Weavers' Societies in Bihar and Orissa and the Registrar gives a glowing picture of improvement co-operation has effected in the condition of two of them, the members of which weave tassar silk. Before these societies were started, the weavers had to go 20 miles to get their supply of cocoons and to sell their cloth. Now they buy a whole year's supply of cocoons at once and the traders have to come to them for cloth at their price. They used to be in rags whereas now they earn Rs. 1-8-0 a day and some of them have begun to build brick houses. Information about the other weavers' societies is somewhat scanty. It is not stated how many of them weave silk and how many cotton cloth. The Ranchi Weavers Stores had a satisfactory year and made a profit of nearly Rs. 4,000. This seems to have been largely due to orders received from the Munitions Board and it is to be hoped that the society will continue to flourish in more normal times. It will have to improve its business aptitude in order to do so, for the Registrar

says that its account keeping was very defective and that too much latitude was allowed to people who failed to keep their terms.

We regret to notice that the Co-operative Agricultural Associations from which much was hoped have proved a great disappointment. These Associations were formed with the object of arranging for the supply of seeds, manures and implements to their members, of undertaking the sale of the members' products in bulk and of entering into any other business calculated to assist their members in the cultivation of their land. Not one of the Associations has, however, been able to achieve all three of these objects. The Nawada Society confined its attention to obtaining and distributing Pusa wheat but its work in that direction is now over as cultivators can get seed either in their own villages or in others close by. The Bihar Society made some profit on the sale of manure but failed ignominiously in its efforts to sell the potatoes grown by its members in Calcutta. The Barh Society distributed a little seed and then collapsed. The Fatwa Stores still struggles on and some members who stocked their grain with it in March and sold it in October got nearly half as much again by doing so. But, as the Registrar points out, it has to be decided whether societies of this class should purchase their members' products outright or merely act as commission agents. If they decide on the latter course, will it be possible to ticket every member's produce and to sell it when he thinks best? And if the stores are asked to supply say 1,000 maunds of grain which is actually in stock and the members refuse to part with more than 300 maunds at the price offered, will this tend to further business? Khan Bahadur Mohi-ud-din Ahmad says that the first condition of success for societies of this character is that they should have managers with sufficient specialized experience of the nature required and that the second condition is that a suffi-

cient number of agriculturists should be willing to raise a substantial share capital and to provide the store with enough business to enable it to pay a good manager. Unfortunately these conditions are more easily laid down than fulfilled. The Registrar adds that it is necessary that the Agricultural Department should help these societies in all their activities and that the time has come when every Central Bank which is established on a sound basis can provide sufficient scope for the activities of a whole-time officer of the rank of an Inspector of Agriculture. As Mr. Noyce pointed out recently in the valuable volume of Co-operative studies edited by Mr. Ewbank and published by the Oxford University Press, which we commend to the notice of our readers, close touch between the Agricultural and Co-operative Departments is very desirable and indeed essential but it is not sufficient. "Agricultural trading societies" (as he calls them) cannot be expected to thrive unless they are treated as an entirely distinct branch of the co-operative movement. The ordinary staff of the Co-operative Department has its hands too full with credit societies to give them the attention they require. They must have their own whole-time organizers and experts and these must be allowed a free hand and must not be bound by rigid rules and restrictions.

We have already mentioned that Khan Bahadur Mohi-ud-din Ahmad is an optimist. In no respect is his robust optimism more clearly shown than in his vision of co-operative mills. As soon as the new Department of Industries in the Province gets going and he is able to count on expert advice and assistance in the matter of machinery, he hopes to make these mills an accomplished fact. He considers that they are certain of success, in the first place because there is an unlimited demand for their products which would be oil, ground wheat, husked paddy and manufactured sugar and, in the second

place, because they would have the advantage of securing all the raw material they require without the trouble and expense of collecting it through middlemen. The Registrar realizes that if such mills are to have any prospect of success, they must be run from the beginning on proper business lines but he does not say where business men are to come from to run them and whether it will be possible to get them on the scale of salaries co-operative societies would be able to pay. The failure of the Agricultural Associations is not of good augury for the success of the far more ambitious project of running co-operative mills. We earnestly trust that the Registrar and the Local Government will go slow in this matter as the failure of an ambitious scheme would certainly cause irreparable harm to the whole co-operative movement in India.

As regards supervision, the system of guaranteeing Unions is making progress in Bihar and Orissa. The number of such Unions doubled during the year and is now 42. It would have been interesting to know how many societies are affiliated to them. It is, however, clear from the Registrar's remarks and indeed from the principle which has led to the establishment of these Unions which is that each society which belongs to them should have an intimate knowledge of the affairs of its fellow members that the number cannot be large and that there is plenty of room for the establishment of more Unions.

The great event of the co-operative year in Bihar and Orissa was the establishment of Co-operative Federation. Nearly 1,800 societies were affiliated to it during the year and most of the remaining societies have joined since the close of the year. No new society is now registered which does not accept affiliation. The Federation seems in a fair way to solve the vexed question of the cost of audit in a manner satisfactory to co-operative societies and to

Government. The arrangement is that Government should bear the entire cost of the audit of new societies and of societies situated in backward areas, should make an initial grant of Rs. 15,000 to the Federation in the first year, should contribute one quarter of the cost of audit of societies of more than two years' standing and should present each new society with a set of registers free until the Federation undertakes its own printing when the latter will be given a further grant for the purpose. At the last meeting of the Council of the Federation, it was decided to appoint two Boards one for Bihar and Chota Nagpur and one for Orissa. The object of these Boards is to enable local co-operators to meet more often at convenient centres in order to discuss lines of development which they would like their representatives to press at the annual Congress meeting of the whole Federation. The establishment of the Co-operative Federation means that the co-operative movement in Bihar and Orissa has been given a very large measure of self-government and that the Registrar will more and more become an adviser rather than a ruler. All co-operators will hope that the powers thus given will be worthily exercised.

According to an official report published in Washington, Germany to regain foreign trade and realise large sums on manufactures that otherwise must remain unsold on account of foreign prejudice, is dumping surplus inferior goods on Britain and the United States. The exports to Britain, according to this report, are marked "Made in America" and those to the United States, "Made in England." Such tactics, the report says, discredit American manufacturers in Britain and British manufacturers in the United States.

SECONDARY EDUCATION IN MYSORE.

BY "LYNX."

I have much pleasure to comply with the request of the Editor of this *Journal*, that I might write him a short paper on Secondary Education in Mysore, and that I might utilise for this purpose the deliberations of the recent conference of the Head Masters and Inspectors, held at Bangalore. Unfortunately they were confidential and one is left to gather the drift of the discussions and the nature of the programme from the speeches of the presiding authorities and the very meagre information regarding the opinions of others published in the press. The principal part of the programme which received the attention of the Conference, seems to have dealt with subjects like the abolition of the Lower Secondary Examination, the Consolidation of facilities for the Education of the depressed classes and the extension of the Provident fund scheme to the aided and private schools. Practically nothing of any useful kind of discussion, seems to have taken place on the subject of Secondary Education and the only justification for writing now a theme on it is the publication by the Government of two important Educational documents *viz.*, the minute by the Inspector-General of Education on the improvement of Education in Mysore and secondly the Government memorandum on the same subject. I am not very keen on saying anything on these publications, though they have now been in print for the last one year, but must observe that the field of Education would have been surveyed from a different angle of view, had the authors of the latter work been conversant with the theory and practice of Education. I would rather proceed to record my own views concerning the one, perhaps the most important department of Education *viz.*, Secondary instruction.

I had always adhered to the view that a sound and efficient Elementary and Secondary Education is the most urgent among the Educational requirements of Mysore and the University Education is something in the nature of an expensive luxury and only those whose intellectual equipment warrants need indulge in it. There can be no difference of opinion that the condition of our Secondary Education is most certainly poor. The different grades of instruction are so linked up with one another that it is idle to talk about the efficiency of any one particular type without reference to the condition of the one the immediately below it. The University is receiving year after year half-baked material and this is simply due to the fact that the Secondary schools admit pupils who are most insufficiently prepared for the methods and standards of secondary education. I do not mean to suggest that the material is at all inherently bad, but it has been mishandled at every stage and consequently requires a long preliminary training before it could be fitted to the new methods and where such a preliminary training cannot be afforded, the results of work must be unsatisfactory in the extreme. I have had opportunities of visiting some of the elementary schools both in the mofussil and in the towns, while in session and nothing useful will be served by expressing my opinion about their condition and work. Every one will advocate that the most urgent need is a thorough-going reform of Primary Schools, but few will really come forward with any practical programme. At the end of the training in our "Lower Secondary" schools, the pupils whose average age is about thirteen, must have been taught to observe accurately, to reason logically and to write out their observations in correct, simple prose. I am not here concerned about the medium of instruction, though a great deal of importance is placed on the subject by some Educational thinkers, for the thing that really matters is the energy and the character of instruction. The main object as I have set forth above,

of "Lower Secondary" instruction would appear ridiculously simple but it is unfortunate, however, that even at the end of higher secondary instruction, those qualities are still subconscious. Aptitude for observing things, though following the lines of natural bent in children, has to be trained to discriminating use and powers of reflexion and expression so indispensable to the growth of intellect have to be sedulously fostered. You can define the end much sooner than lay down the means for its attainment, and they comprise an adequate provision of trained staff, correctly written books, buildings and equipment. As regards the Lower Secondary grade, the latter two are not formidable problems, for remember that some of the most eminent educational reformers have got on wonderfully well without any apparatus or teaching material except those improvised by themselves. If a teacher has not skill enough or that mental alertness to use pebbles in teaching arithmetical calculations to the children in the Infant class or to use a map of India drawn by himself to teach Commercial Geography, in the third form you may be certain that an Abacus and Johnstone's sheets are dead matter to him. I would honour the teacher who has sense enough to propose to his class "well, children, come let us go out and pick a few pebbles each," and uses the occasion for counting, "How many have you got, and you," and so forth and incidentally teach something regarding the shape, feel, colour and other properties of pebbles. The gain on the intellectual side, is a very successful lesson taught and on the moral side, the pupils will have, under skilled guidance, gained the steadying influence of cheerful discipline. My heart is filled with anguish when I see on the mud walls of our elementary schools, coloured prints of foreign animals and plants which form the staple of instruction in them. How can teaching be real, and where is enthusiasm. It is absolute waste of money to buy such coloured pictures which, however, should be

the handiwork of teachers and pupils, during the progress of the lesson and particularly good productions should have the honour of adorning the walls of the class room. They will then discover a tongue and deliver their message of hope and promise to the succeeding generation of scholars. Education is really *doing* and *reflecting*. How can you have really good and national Education where the teachers wish to use finished and artistic product of foreign make and hold forth in a solemn manner, generally imperfectly, on the philosophy of things? How can the teacher secure the attention of the children which is most fugitive, except by a *birch*? I call this miseducation,—a set lesson on objects and things in the making of which neither the teacher nor the pupils have participated. Imagine on the other hand a teacher dividing up his class into small blocks after a few preliminary instructions, and assigning to each "block," a small lump of clay obtained from the neighbouring tank, and proceeding by deft and repeated supervision, to obtain from the "blocks" of pupils relief maps of India, in illustration of cultivation, rain fall, water course, commerce and every other aspect of Indian Geography. Similarly History, Nature knowledge and Elementary Science. "Doing" like this secures for your Education elements of truthfulness and honesty which are also elements of Religion and Morals and your Education is mis-education because these elements are divorced from their proper place and attempted to be taught as separate lessons. Remember that creed and dogma taught through set lessons from books are the parent of cant and sham so fatal to all good education and no one is more shrewd than children to see that what is taught in the Sanathana Dharma is a trifle different from the practical exercises in the class room, if such exist. Your Education again is mis-Education because there is not much "*doing of things*" where children learn that value of corporate action and develop that sense of mutual responsibility

which are the foundations of good citizenship. On the other hand we rely too much on the force of set lessons to instil into the youthful minds these doctrines and like most other lessons given straight from books, they are forgotten after the hour is done. Take up the time-table sheet of any Elementary or Lower Secondary School and you find indicated on it so many periods of every day set apart for instruction in Religion, Morals, Citizenship and such other good things but all too incomprehensible to children of all sizes and growths. The inference that the children draw from such a time-table is that at other periods of school work you can afford to be irreligious and immoral. What is character if it is not the determination to be good, and straightforward in ones work and how far have you succeeded in building up the character of your boys, by discoursing to them weekly or daily lessons on the exploits of a dead hero. No, you have to come back to the old conception of Education that it is a life-process; it consists in "doing", this "doing" is acceptable only if it is true and honest; the more true and honest this "doing" the higher is the exaltation of life. This is the Philosophy of our Elementary and Lower Secondary Education and though the process may be somewhat slow—which is bound to be in the hands of the unskilled teaching agency,—the foundations are absolutely sound. The superstructure will rise with rapidity thereafter.

Any person not endowed with sufficient courage of that statesmanship and administrative skill which come from knowledge,—may be disposed to think that the above is a bundle of counsels of perfection and are outside the beat of practical politics. There is hope in the Present Inspector-General of Education who combines both courage and knowledge in a very judicious mixture indeed. The ideal of Elementary and Lower Secondary Education such as a parent like me would wish to see developed in his children at about their thirteenth year, consists in three

simple factors *viz*, ability to observe, ability to reason and ability to write. The method of instruction at this stage is "Learn by doing" and *not* "Learn by hearing." The equipment for such instruction would include rooms with simple and comfortable forms, a generous supply of *raw* materials and implements for all the different processes of "doing". The addition of coloured charts, models and such other expensive uneducational appliances may give to institutions of this grade an air of up-to-dateness but are by no means a guarantee of efficiency and right course of instruction. Give me the right kind of teacher and I guarantee you will have hundreds of these teaching appliances which may be crude but of the utmost Educational value,—prepared by himself and his pupils. Witness the exhibits in the Educational Museum at Bangalore, which are the handiwork of English children and masters of the Elementary grade. It is appalling that none of the thousand and odd schools in Mysore has contributed a single exhibit, of any kind, either by the scholar or by the teacher. An Educational Museum is at once a temporary and growing institution, but that at Bangalore, is very static indeed. It is this sort of education as is manifested by the English Exhibits that our children should receive in our Primary and Lower Secondary grades and if it is not insisted upon by the Inspecting Agency, then all the time and money spent in erecting the museum are a waste and you cannot persuade the parents to believe that all is well with their children's education. Well it is true that the children get the education that the parents deserve and these parents even in the piping times of peace take no more notice of their education than payment of fees and despatch of a commendatory note to the master if the boys are not promoted. In one of his contributions on the Educational subjects which he wrote in 1914, the present writer advocated the formation of District and Taluk Boards for the control of Primary and Lower

Secondary Education as a means of bringing the apathetic parents and general public into living touch with their boy's education and compulsory periodical supervision of these schools either independently or along with the Inspceting staff on the part of the Board Members was suggested as a means of developing the appetite of the parent for abundance of good education for his boys. The present writer is gratified that the Madras Elementary Education Bill has adopted this measure of forming District Boards and he hopes that they will be worked in the right spirit free from communal bias.

I now come to the Higher Secondary Education which extends over the most critical period in the intellectual development of the youth. The secondary institutions are a workshop or a factory in which the principal share-holders are the Government and not the private agencies. The investment of money in these Schools and Colleges enables the Government to command a supply of trained minds and resourceful inventiveness in the output to be utilised in the different branches of administrative machinery. A far-sighted parent ought to demand a higher standard of training for his children in these schools, in view of the economic stress and competition, and would insist on the Government providing a wider scope of opportunities for receiving that kind of secondary education for which his boys are best fitted. It is not yet time in India for the Government to withdraw from the field of education in any grade, for the Indian community has not yet established any very large industrial and commercial organizations of their own for the absorption of the secondary grade men and graduates. That day is yet far off and when it arrives, the Government ought to be able to hand over to its people really high class institutions. If the Government recognize that its greatest foe is not the agitator, but the ignorance of its people then it has to put into the fight all the sinews of war it can. But at present we

reserve this doctrine to be trotted out on occasions of platform oratory.

First class buildings and complete equipment of them will not assure efficiency of School instruction, though they are not to be despised. The presuppositions of education are the teacher, the pupil and the materials of teachings. There is nothing bad about the latter two, though I would say that our schools are far behind anything like reasonable equipment. What the Government,—I am not concerned here with the aided agencies which do not enter into my scheme of ideas,—have done is this. They have put some people—though there are honourable exceptions in charge of these schools, to whom teaching is a trade,—quite a temporary expedient of that. You do not put a ship in charge of a Captain who knows nothing about the compass and the barometer for here the catastrophe which will overtake such a policy is most demonstrative. We don't hesitate to put a teacher in charge of a school, who is as ignorant of the child mind as his own and we never bother about the ruin that befalls the mind. As the process of imitation is silent and slow,—hence all the more sure,—we take no trouble to watch it. The problem of the teaching staff is most interesting. He sees that others engaged in the different functions of administration are well off and naturally compares the situations—when he asks for promotion and betterment of his prospects, he is told, “nowhere in the world is a teacher paid the salary due to the civilians.” Whoever may say it, he must admit that he has no right to expect work on the part of the teacher comparable with that of the civilian. The answer I have put under quotation marks argues rank ignorance and the sayer of it could not have seen much of the world. Take any country where education is worth mentioning. In Germany there is only one civil service, and Education is the first department in it; the teachers and professors receive salaries not one whit below what is open to the highest civilian

and their wives are entitled to pensions. But Germany does not employ in her educational service, as in other departments, men who do not know their job, and those that enter it have no counter attractions. Consequently the progress of knowledge in German Schools and Colleges was an unbroken line and the bulk of them are Government institutions. In India, we have admitted into service cheap men and the authorities are not in a position to say to them, "No, this I consider is your wages and if you are not satisfied you may go," for they cannot attract better men. The teacher problem is not a formidable one. You have got to recognize only one service in the state and it matters very little where you put the teaching profession, so long as you do not introduce different scales of pay and promotions should run on parallel lines. The teachers in the Elementary Schools, who *ought to be graduates holding professional diplomas* and none else, should be permitted to rise to the minimum salary of the Assistant Commissioners and those in the High Schools *who ought to be honours men with higher professional training* should be permitted to rise to the minimum salary of the Senior Assistant Commissioners. No body need think that these are moon-shine proposals, though it is true that Government will turn up their noses at them. But if we are not prepared to pay a higher rate to our masters who have got to "mould the character and shape the minds of our future Dewans and administrators," what is your justification for paying increased rates of salaries and perquisites into the bargain to the officers who deal with dead writing and paper. If you adjudicate rates of pay in proportion to responsibility of work then you should immediately reverse the scales of salaries in favour of the teachers, for which is more difficult, to be in charge of the mind of the future citizens and administrators or to be in charge of written manuscripts. It is not difficult to conceive the mode and direction of the formation of the intellect and

character of our potential Dewans and merchant magnates, not omitting other bigger citizens and administrators, ranged on forms without backs, in charge of a school master into whose soul the iron had already entered and whose daily wages for fashioning greatness in men, is annas eight, only $\frac{1}{4}$ of the daily earnings of the Coal miners in England who have struck because the authorities would not summarily add another two shillings (equivalent to four day's wages of our teacher) to their daily receipts. There is already the growing feeling that the schools are the refuges of the rejects and if we help in the accentuation of that feeling, the smash will come, not certainly at once, but in its time and when it comes it will be overwhelm us. Of course we may not be immediately affected, but if we ignore the demands of the generation still in the making, we are false stewards of the interests of the present. You may construct the finest buildings, equip them with all the new fangled appliances, frame an artistically perfect scheme of studies, but if there is not the mind that is cheerfully content with the prospects of promotion and situation to work them all these are dead waste; perhaps the only result is the production of a generation of young men filled with the most pessimistic doctrines of human life and conduct. These young men are our future rulers. Let me leave the problem at that.

The ideal of the High School instruction ought to be to provide the boys who seek its benefits, with a strongly developed average intellectual strength, enabling them either to enter upon a course of preliminary training for the University Education, or to enter upon a course of any professional training. The unsatisfactory features of our High Schools are the size and composition of the classes, the accommodation and equipment and finally the curriculum of studies. The Sadler Commission has recorded some very excellent proposals for the reform of Secondary Education and their recommendations

naturally partake the character of English public schools; though some of them are sound, it would be unwise to adopt them wholesale in a small state like Mysore where conditions and needs are not entirely identical with those of the neighbouring provinces. The total admissions into the IV Form, the lowest class in the High School hierarchy, in any year represent about 75 per cent of the strength of III Form and when the Lower Secondary Public Examination is abolished the admissions may be larger. To me it appears that this is a serious matter to the High Schools, which have to find increased accommodation and appliances which are always slow in coming, to say nothing about the staff. The old matriculation system was devised to serve a smaller number for the University and administration needs and the system became an anachronism for several reasons. In the first instance the classes became hopelessly large as the direct result of the expansion of the desire among the community for more Secondary Education. The composition of the classes, was not favourable for producing good results through common instruction and the outlook of High School students never extended beyond the University and cheap careers, nor was it favourable for the adoption of any improved methods of instruction. The students coming from the slower grades were already badly handled and this process was continued throughout their secondary course, with the consequential numerous failures at the Matriculation Examination. The S.S.L.C. that has been substituted is worse and is a feeble imitation of the courses of studies adopted in the English Public Schools. Let us remember that the average age of the High School youth in South India in the Mysore is 17 and I should consider it unwise at this stage of the mental development of the boys, that the classes should be split up into separate blocks for intensive work in subjects like Mathematics, Physical and Natural Sciences or humanistic studies. Add to this, the pres-

sure of weekly examinations and markings in the certificate, and you have absolutely no Education, but all else. The S. S. L. C. must go, before you can think of any rational reform of Secondary Education and indeed it is impossible for me to conceive how you can have a sound university education with the S. S. L. C. still existing. It is equally impossible for me to conceive how you can found a University, without a preliminary reform of the Secondary Schools and bring them up to the level of the University needs on the one hand and on the other the needs of the Government and the community which absorbs our output from the High Schools.

In planning a course of studies for the High School one cannot afford to forget the average of the youths and the previous training they have received. I assume for the purpose of this paper, that at the base we have a well staffed Lower Secondary School which passes its pupils who have reached the ideal of the Lower Secondary instruction, which I have set forth above, to the High School. Any body who is acquainted with the elements of Psychology will tell that it is inexpedient to devise specialised courses for youths between the ages of fourteen and seventeen. On the other hand the mind is most sensitive to impressions of many kinds of knowledge and is fit for laying the foundations of general culture without which specialization is spurious. The intellect of boys at that age has a many-sided interest and has a more or less omnivorous appetite on whose judicious gratification lies the ordered progress of instruction. The intellectual occupations ought to enlighten and practise the conscience where as many windows as are already present, should be fully thrown open and new ones established. I do not believe that at this stage it is expedient to devise a course for varieties of individual aptitude at which the S. S. L. C. course plays, for the simple reason that the mind is not yet individualised in intellectual interests. Remember that our S. S. L. C. system is a

feeble echo of the Secondary School course before 1809—25, and our old matriculation corresponds to the modern German High Schools. The Germans believe that the thing that matters most at this stage is the importance of securing a high level of average intellectual competence, without regard to individual aptitudes which should develop in the Intermediate grade. Our old matriculation system failed for two reasons. Firstly because we simply carried over to the High Schools the methods of instruction pursued in the Lower Secondary grade, *viz.*, of teaching the class as a unit for all subjects, and secondly because our staffing was both inefficient and inadequate, apart from the size and composition of the class. The Germans have been able to maintain an excellent standard in their High Schools because they have provided a skilled and most intensely trained staff and you do not see any defects in the system which was undermined in South India. The remedy was not the substitution of a system given up in Germany and practised in England whose conditions are entirely different from our own. "The New and more individualising method came into English Higher Secondary Education during the second phase of the Industrial revolution, and the change reflects the regard for individual effort which was common to much of the English thought at the time." There has been no revolution in India of any kind and magnitude and yet we have thrown out our well tried matriculation system and adopted the S. S. L. C. course. We are children in education as in most other matters and novelty pleases us and we mistake it for originality. But what was the older English method. It was the present day German system. Any new system is bound to fail if it is not supported by public demand and there was absolutely no demand from any quarter for this S. S. L. C. system. We are keeping on to it, lest we should be laughed at for readopting the old method.

The defects I have noticed above regarding

the old High School system—which is synonymous in our minds with matriculation, but we shall give up now the term because the High Schools I have sketched here and are recommended by the Sadler Commission are not the training ground for admission to the University,—could have been remedied by a slight readjustment of studies and better staffing. Let me repeat here that without a very highly trained skill in teaching, all plans, however carefully designed, are bound to fail and the blame does not attach to the system, but the agency which employs teachers. The object of the High School teaching being a general culture in the individual and a high level of average intellectual competence in the boys, I proceed to lay down the following curriculum of studies as best suited for the attainment of the end. I assign to the vernaculars the same position as English in regard to teaching methods and general attainments. There are six compulsory subjects and the courses sketched out are to be covered in three years.

1. English. (a) Prose.—600 pages of modern prose, chiefly dealing with stories, novel, adventures and scientific discoveries and inventions.
- (b) Poetry.—600 lines of modern narrative poetry.
- (c) Composition.—The class is to be divided into blocks of manageable size for individual attention. Composition classes may vary with conversational classes in which powers of expression in correct simple English will be encouraged. On the time-table, I would show two hours for prose, two for poetry, and three for composition or conversational classes.

2. Vernaculars or a Classical Language 6 hours.—Same as above. Substitute translation for Composition in the case of classical language.
3. Mathematics, 3 hours—one hour per week per subject.—(a) Practical Geometry including Mensuration and Surveying.
(b) Algebra.
(c) Arithmetic.
4. Natural Science: (a) Physics, (b) Chemistry, (c) Human Physiology: three hours per week; the subjects should be treated practically with plenty of demonstrations by the teacher. Special references to Hygiene are to be made in the Physiology course.
5. History: (a) Indian, (b) English, mainly the history of the people and their institutions, 2 hours in the week.
6. Geography: (a) India, (b) General, including, physical, commercial and Industrial aspects of the subject, 2 hours in the week.

Non-examinational Compulsory subjects.

1. Manual occupations like Sloyd—2 hours.
2. Art work. Drawing and painting—2 hours.
3. Physical Exercises.—1 hour.

Optional subjects with optional examinations.

1. English, or any European language.
2. A Second Vernacular or Classical language.
3. One of the mathematical subjects.
4. One of the Natural Sciences including Biological subjects.
5. History of India or History of the British Empire.
6. Advanced branches of Geography.

Instructional and tutorial guidance will have to be provided in the above subjects outside the class hours for such students whose special talents and intellectual predilections might lead them early to take additional course in them. With a view to enable them to obtain a distinctive certificate,

the students in these optional groups ought to be permitted to take an examination in them. The institution of such optional courses certainly favours individuality and the growth of centres of intellectual interests in the more intelligent scholars. I have not included in the optional category any of the technological and professional subjects, which according to my conception of the aim of High Schools, lie outside the main trunk and begin after it is done.

I am aware that the Sadler Commission recommends only four compulsory subjects *viz.* Vernacular, English, Elementary mathematics, and Geography and the candidate is to bring up for examination one other out of a list comprising classical language, an approved scientific subject, additional mathematics and History of India. It is open to doubt if the curriculum so constructed would lead to the attainment of the end of the higher Secondary Education as defined by the Commission *viz.*, a preparation for life, but also specific in its preparation both for the University and immediate entrance upon other careers. It is certainly not an improvement on the old High School Syllabus and is not more liberal than the Mysore S. S. L. C. Course. Dr. Gregory has expressed himself in his minute warmly over the omission of Science from the Compulsory list and it is decidedly a better subject than Geography from the educational point of view. A non-compulsory subject is usually the non-taught subject also in our Secondary Schools and a certificate as to its being taught is not a trustworthy credential at all. From a cultural point of view, the curriculum laid down by the Commission is very defective indeed for drilling Science and histories on the Compulsory list and affords a most insufficient preparation for the University course. At the recent Conference of Head-masters held at Madras, the discussion on the S. S. L. C. subjects as reported in the press, seems to have demanded the inclusion of more technological

optional subjects. This will not prepare the pupils for the subordinate careers in the workshops and factories such as we have at present but the cost of providing the necessary equipment for such technological training will chill the enthusiasm of the controlling agencies. But my own feeling is that at the first blush of novelty, the pupils are likely to rush and discover the mistake of their choice when it is late. As I have said already that in any new scheme of studies that we may frame, we cannot altogether afford to forget the age and the psychological bearings of the mind at that age of the pupils to whom they are intended. We are somewhat proceeding on the old empirical lines of either going on adding to the list, some one or other subject to make the thing attractive or drop it without ceremony if it does not prove its popularity, but rarely do we think about the age of the pupils and the methods of instruction which really matter.

As a parent to whom a sound all-round Secondary Education of his boys is an asset, I should insist on the following.—

I. Only the very best staff that may be secured by the scale of pay Rs. 200-25-400, efficiency bar, Rs. 400-25-600, should be employed in the High Schools. Any other pay will only attract the wash-outs and the children's education becomes a long process of miseducation. If the Government think that the money they put on their teachers will bring back to them a return in hundred fold in the shape of a splendidly-trained generation of youth who will carry forward their administrative schemes and not corrupt them, then let there be no stinting. The efficiency bar in the case of these secondary teachers, would be their contribution to the subject which they profess and the Educational theories which they practise. While on this subject, let me state how the cordiality of feelings between the Head-masters and their assistants—which has been unfortunately one of the topics of discussion at the Madras Conference, could be improved. The Head-

master is only a senior assistant and should not be in any way different either in point of pay or position and for the performance of additional administrative duties, a special charge allowance should be attached to the incumbency. I would go a step further and suggest that the head-mastership should go round the more competent of the senior assistants in rotation, and every such assistant will have the chance of giving the Institution the benefit of his administrative skill and the practice of his Educational ideals. I cannot conceive of a better plan for the promotion of a spirit of close comradeship and a zealous devotion to common ends, among the assistants and for the removal of the galling sense of subordination with its attendant exclusiveness and jealousy.

II. I believe that the abolition of the S. S. L. C. and the substitution in its place of the old High School curriculum with such alterations as are indicated below is what the student between the ages of fourteen and seventeen needs.

A. Compulsory Subjects with an Examination.

Subjects.		Class IV	Class V	Class VI
English	Prose ...	2	Same as in the IV class.	
	Poetry ...	2		
	Composition or Conversation.	3		
		7 hours per week		
Vernacular.	Do.	6		
Mathematics	Geometry, Algebra, Arithmetic.	1		
		1		
		1		
		3		
Natural Science.	Physics	1		
	Chemistry	1		
	Physiology	1		
		3		
History	Indian	1	Same as in the IV class.	
	English	1		
		2 hours per week.		
Geography	Indian	1		
	General	1		
		2 ..		
Total Subjects 6.		23 ..	23	23

The remaining five working hours will be utilised for the Compulsory non-Examinational subjects like art-work, manual occupations and so forth. My main object in allotting 3 hours per week to composition and conversation is obvious. Given the very best staff, the methods of instruction will be most appropriate though I would watch their progress and maintenance of high standard through the Inspecting agency. I need not dwell on the methods of Instruction but shall proceed to say a few words on Examinations. We cannot entirely do away with examinations, but we can mitigate their terrors and make them look quite as part of the legitimate work of the student. According to my plan, the average student will bring up only the above six subjects and the forward boy another additional optional subject for the final High School Examination. In the fourth and the fifth classes, the class examination should bear on the specific portions of subjects covered during the year and each student should be handed a certificate by the head-master showing only the marks obtained by the pupil in the several subjects. No detention of any student is to be permitted at any of these stages and at the final examination, the whole class of students should be presented. At the final examination, the questions will bear only on the remaining portions of the subjects taught in the VI class and all differences in the quantity covered in this year of work between one school and another, will be met by the conduct of examination I have in view. You should not make teaching in the different schools rigid or conform to a dead level. I recognise that the plan of examination suggested by the Sadler Commission is an excellent device, and is the only means of removing the present strain. The Board will comprise as follows:—1. The principal professors of the Colleges representing the subjects, *i. e.*, 6. The head-master, two assistant masters and the Inspector of the range co-opted. The Board will examine

through papers and also conduct viva voce examination, on the following scheme.

Subjects.	No. of Papers.	Viva Voce.	Marks.
English.	*1. 3 hours duration.	1.	100+50
Vernacular.	1. „	1.	100+50
Mathematics.	1. „	—	100.
Natural Science.	1. „	1.	100+50
History.	1. „	1.	100+50
Geography.	1. „	1.	100+50

* Each paper will contain 75 per cent more questions than the number required to be attempted.

The Board of Examiners in visiting the different schools, will take note of the equipment, methods of instruction, qualification of the staff, general tone and discipline and their bearing on the students called up for the viva voce for which the Board will, of course, divide into smaller sections. In assigning the marks, due credit will be given to the students' performance in the IV and V classes, as recorded in the certificates, and his class notes and other authentic records of work which have been scrutinised by the staff from time to time. If you come in contact with the examiner you will certainly know more about him than is revealed by his papers alone and if for any reason his performance in the papers should be defective, you have other means of judging his capacity *viz.*, the viva voce, his previous certificates and his records of class work. When the students know that they will be judged by all these tests, the final examination holds no more terrors to them. The certificates awarded to the candidates at the end of the final examination will bear only the marks obtained by the candidates with opinions of the Board about the marked efficiency of any candidate which cannot be expressed in terms

of numerical figures. I do not suggest any practical examination in the science. This examination is not a matriculation, for the High School course I have sketched above is not a preparation for the University but provides the minimum general culture so necessary to all who wish either to qualify further for the university or any professional career.

If you accept the recommendation of the Sadler Commission that the preparation for the University course should extend over two years, then the pupil cannot enter the University in the most favourable circumstances, earlier than twenty, but if you make the High School course fairly intensive and wide, this preliminary course needs even then two grades which according to my ideas, will enable the student to enter the college at nineteen; though under the old dispensation there used to be excellent graduates well under that age.

The wisdom of a man is measured by his foresight and judged by this standard, we could not have displayed much of that quality, when we, parents allowed the authorities to carry on the intermediate work in our admittedly weak high schools. They were improved in no way to assume this responsible and new task at the time of founding the University and who can say that any good has resulted from such a procedure which as I have said already was blessed on all sides on account of its novelty. The Sadler report recommends the institution of Intermediate Colleges with a double purpose *viz.*, as a preparation for the University work and secondly for practical occupations. I am afraid this general training is carried to a late age and the only justification for the suggested plan of the Commission is that at the age of eighteen the students are not likely to be in a position to judge for themselves for what careers they are best fitted. The Commission have had to recommend a general course in the Intermediate for students of eighteen, because their proposals for the High Schools are weak to a degree.

If you reform the High Schools on the basis of staff, buildings and equipment I have set forth above, you may proceed to attach to them in selected districts, the Intermediate work whose model as I conceive it is different. You have got to specially equip these Preliminary Schools which name I prefer to the Intermediate Colleges. In fact the plan I have suggested below is the only way in which the interests of University Education can be freed from motives of preferment in the administrative functions. The main object has been to provide for all the ingredients of a liberal education coupled with a training of special aptitudes which students of seventeen ought to be able to have discovered or discovered to them on the termination of an intensive and wide High School training. At present we are wasting higher training in the sciences and arts on students, with neither ability nor ambition to excel in them, but whose whole field of mental outlook is circumscribed by the four walls of the Government offices. The Compulsory course in the Preliminary Schools will comprise English, Vernacular and Logic and the optional studies will embrace one of the following:—(i) Sciences, comprising Mathematics, Physics, Chemistry, Comparative Anatomy, Botany and Dynamical Geology; (ii) Arts, comprising Modern European History, Modern Indian History, Ancient History of Greece and Rome, Elements of Economics, Advanced branches of Geography and Outlines of Anthropology; (iii) Similarly Departmental tests comprising the lower branches of civil, criminal law, revenue, accounts, office procedure, and precis and typing; (iv) Civil subordinate engineering; (v) Mechanical subordinate engineering; (vi) Agriculture; (vii) Technological subjects. (viii) An additional vernacular and a classical language, grammar, elements of philology and outlines of the history of language; (viii) Subordinate pleader's test. I omit from this list, pedagogy, medicine and law and no body except those who have given promise in the

colleges should be permitted to select these subjects, for the issues involved in the selection of subjects are of vital importance to the orderly progress and welfare of the community. The standard of admission to these respective studies should be laid down in specific terms of percentages of marks obtained by the students in the final High School examination, it being open to any student to go back and improve his prospects of admission to any particular branch for which his certificate is not a sufficient testimonial. Every one of these branches must naturally lead to the respective faculties in the University if the pupils desire for higher and wider training or the certificates they obtain at the Preliminary Examination ought to entitle them to posts in subordinate services of the different branches of administration and commercial and industrial organizations if we have any. I make law one of the faculties of the University and not a post graduate study like Teaching and Medicine; practice of which require a prolonged and sufficiently deep training in Science or Arts. The institution of a University faculty of departmental tests in their higher branches, in which you offer Degrees is the only way of emancipating your scientific and humanistic studies leading to prove investigations. I have considerably exceeded the space limit I had originally proposed to myself and I must stop at this stage.

Great interest was aroused some little time ago by the reported discovery of a new motor fuel, of which the chief ingredient appeared to be water treated with a liquid which made it equal to petrol at about a tenth of the cost of the spirit. The inventor was careful to guard his secret until it could be exploited on favourable terms, but tests were made in England, which apparently proved all his claims. It has now been discovered that the mysterious fuel is simply acetone, which costs more than twice as much to produce as petrol, and the ingenious inventor is now detained in the United States to answer no charges of fraud.

INDUSTRIAL PROGRESS IN BARODA STATE.

By A. P. SMITH.

FROM a perusal of the Annual Report of the Department of Commerce and Industry in the State of Baroda for the year 1918—19, it is impossible to congratulate the Baroda Government on the progress made during the period. Experiment, inquiry, non-success and hope for the future, characterize the activities such as they are, of the department. To quicken the pace apparently the Department of Commerce and Industry and that of the Registrar of Co-operative Societies, both being under one management, were separated, and an additional department of Statistics and Emigration inaugurated. In the last report mention was made of the re-distribution of Agricultural Land; but no particulars as to the manner and extent of re-distribution were afforded. It was a Special Inquiry made by a Committee appointed for the purpose and the Government approved of the recommendations made and rules were framed on the lines suggested, and orders were even issued to take up the re-distribution of agricultural holdings in Ladol with the natural consequence that the cultivators were found to be unwilling, and the remarkable result that the "idea had to be dropped." It was natural for the conservative cultivator class to decline to adopt the proposals of the department; but it is extraordinary that the cultivators were not consulted before everything was cut and dried! The report states that the draft rules were published inviting public opinion and criticism and it may be presumed that, in the absence of hostile criticism the re-distribution was taken up. The Indian agriculturist especially, is notoriously conservative and does worship to the idol of *manul* and every endeavour ought to have been made to consult and

convert him. If no hostile criticisms appeared, it would seem that there is no properly organized public opinion in Baroda. Another Special Inquiry was the collection of social and economic data relative to the men of two regiments of the Baroda Army—a by no means formidable task but owing to pressure of other work the subject could not be given due attention; and so the new Department of Statistics is to accomplish the task. A third Special Inquiry was undertaken by the Economic Development Committee—and the report was finally drafted and will “shortly be published”. A fourth Special Inquiry concerned the Bhadkal Survey. The survey was completed all right, but for some occult reason Mr. Nanavati, the late Director of Commerce and Industry, carried the papers with him to England and will publish the report on the survey on his return. The fifth Special Inquiry related to the advisability of introducing a Terminal tax in lieu of the octroi duties and tolls in force. The inquiry materialised in a scheme, the proposals for which are before the Baroda Government.

Besides these foregoing Inquiries the following Industrial Investigations occupied the department. The investigations and results are summarized as follows:—
 (a) Woollen Manufactures—Still in the experimental stage. (b) Cement Manufacture Experimental stage: (c) Wood Distillation—Experimental: prospects promising. (d) Dwarka salt—success achieved in manufacture of table salt. Permission of Supreme Government requested for export purposes. (e) Forest Research Proposals before Government. Further consideration contingent on return of Professor Naik from England. (f) Tanning and tanning stuffs: Report before Government. One factory fairly successful with vegetable tan stuffs—Proposals formulating to train Chamars for the work. (g) Ceramic Industry—Experimental stage. Proposals to be submitted to Government when a suitable man is available.

(h) Manufacture of Deshi paper—Proposals sanctioned.

Under the heading “New Industries” an application for a lease of the salt deposits of Okhamandal for the manufacture of Chemicals which had been forwarded to Government, the year previous, remained still “under consideration”. Similarly an offer to start an oil mill was “under consideration”. It is something, however, that a lease was extended during the year for the manufacture of Cement, and that the policy of inviting capitalists from outside the Raj and of giving subsidies to local capitalists was continued. As a result of this there were seven applications altogether, four from outside and three inside the State. Three of these were favourably considered, (whatever that may mean) one was under consideration and three were under further investigation. Another business proposal for facilities to manufacture alkaloids and other extracts from duty free denatured alcohol was received and was pending disposal.

While tangible achievement has been negligible it is clear that the State is earnest in promoting industrial effort, for no less than Rs. 3,450,000 granted in the shape of loans, while other valuable concessions in the direction of developing the industries of the State were granted. Hand-loom weaving demonstrations and the introduction of fly shuttle and automatic looms were steadily kept in view, while tentative experimental work in the cultivation and development work of pearl systems, dyes, clays, soda deposits, ore, chinawares, well boring, etc., was done. No meeting of the Industrial Advisory Board was held during the year, but is promised for November of the current year to consider the Report of the Economic Development Committee.

The report under review winds up with a list of Joint-stock Companies in the State from which it would appear that the number of companies on the Register at the end of

1917—18 was 33 with a total authorized capital of Rs. 13,415,664, a subscribed capital of Rs. 7,437,264, and a paid up capital of Rs. 5,761,871. Of these 3 were "cancelled" during 1918—19 and of the 30 left at the close of the same year 21 were working and 9 were dormant. A list of 19 Benevolent societies engaged in education and other social activities numbers 19. From appendix III we learn that in 1917—18 there were existent 183 factories of sorts with 201 boilers and, at the end of 1918—19, there were only 115 and 129 respectively. No explanation for this alarming decrease is given. In a State like Baroda we can quite understand that, at first, the progress must be slow, but it seems to us that there is a sad lack of expert knowledge and advice, and unnecessary and vexatious delays which result in real business men fighting shy of dealing with the Government; and too little push on the part of the authorities. The market waits for no man, and unless prompt and intelligent response is made to business offers, and the State is prepared to let the enterprising capitalist make more money than the state recovers in the way of profit, industrial progress will be very slow indeed.

The bee and the wasp used hypodermic needles long before man ever thought of them, and the bee uses formic acid as an antiseptic to preserve its honey from fermentation. The spider made the first suspension bridge according to all the rules of the craft; and some spiders make excellent airships; one of them even makes a diving-bell. The bee makes a wax that we cannot imitate. The silkworm is still the unrivalled manufacturer of silk. To these we might add the ant, which makes tunnels and subways; the mason bee, with its cement work; and the great peacock moth, which called its kind from a distance by wireless telegraphy long before man had dreamed of the possibility of wireless.

JAPAN AS AN INTERNATIONAL TRADER.*

IT is probable that every authoritative review of the commercial problems which confronted Japan in 1919—and, in a large measure, still confront her—will provide an illuminating study for economists and business men for several generations to come. Her rapid transition in the War years from a debtor to a creditor country, the abnormal, and in some cases the artificial, expansion of many of her industries, the sudden creation and subsequent decline of others, the feverish speculation of her financiers on a continually rising market, and her virtual monopoly, with the United States of America, of trade in manufactured goods in the leading markets of the world—all these phases of commercial Japan during the War, stand in sharp contrast to the reaction which set in after the Armistice.

It is therefore inevitable that the Report of Mr. Hugh Horne, Commercial Secretary to H. M. Embassy, Tokio, on the "Commercial, Industrial and Financial Situation of Japan, 1914-1919" (Cmd. 912, Price 9d. net), will be studied with more than average care by British firms interested in world trade. Its immediate value to our manufacturers and merchants rests in its close analysis of those Japanese industries, and their output, which have entered into strong competition with British manufactured goods in India, China, South America, and elsewhere. Attention is directed to the particular lines in which this competition is likely to be more keenly felt in the "Imperial and Foreign Trade" Section of this issue. We are here concerned only with certain general considerations affecting Japan as a producer of goods for export and as a competitor in overseas trade.

* With acknowledgments to the Board of Trade Journal.

WAR PROSPERITY.

Immediately prior to the War Japan was experiencing strong reaction from the economic activity which followed the Russo-Japanese War. Commerce and industry were showing signs of depression, the balance of trade was increasingly adverse, and money was not plentiful. This downward tendency continued, and was in fact accentuated after the outbreak of hostilities owing to the general dislocation of trade throughout the world and the disturbance of foreign exchanges, but the early days of 1915 witnessed a sudden and strong revival. A period of unprecedented prosperity set in, and continued without any real setback until after the Armistice was signed, though the economic world experienced a momentary shock in 1916, when it was rumoured that the Germans were going to make peace proposals. Large orders for munitions and other war supplies arrived from the European Allies, and the disappearance of German and other European goods from markets in India, Java, China and other countries in the Far East, created a strong demand for Japanese manufactures. In addition to these factors of development the world's shortage of carrying tonnage stimulated shipbuilding activity to an extraordinary degree, and provided shipowners with lucrative opportunities for charter.

POST-WAR REACTION.

The conclusion of the Armistice in November, 1918, was followed by a period of deep depression and gloomy foreboding. It was generally expected that hostilities would continue for another year or eighteen months, and forward business had been extremely active. The first blow was a sudden fall in prices, due to various causes, such as decreased demand, removal of embargoes in America and Great Britain, and the probable reappearance of goods from belligerent countries. Then came heavy cancellations of war-time orders, particularly from South

Africa and Australia, due chiefly to the prospect of obtaining British and other European goods, which had been shut out owing to the war. Business moved very slowly during the first few months of 1919, but subsequently boomed, with the result that the total exports and imports exceeded Yen 4,000,000,000 for the first time in the history of Japan's foreign trade, the balance being in favour of imports. A strong note of pessimism appeared in the Press over the return of the so-called adverse balance, which had been interrupted during the war, but insufficient account was taken of invisible exports, particularly the very considerable returns from the carrying trade.

IMPRUDENT TRADING AND FINANCING.

It was said that Japan had, generally speaking, availed herself of the trade opportunities created by the War. Unfortunately, many manufacturers and merchants, in their anxiety to accumulate big profits rapidly, placed goods of very inferior quality on denuded markets; the imprudent policy was largely responsible for the numerous post-armistice cancellations, and has aggravated the difficulty of consolidating positions in such countries as India and Java. Further, the accumulation of wealth and the plentiful supply of money developed a mania for company promoting out of all proportion to the needs of the country, and shareholders have been far too eager to reap dividends of 60, 70, and even 100 per cent at the expense of prudent provision for future development. At the present moment there is a considerable measure of anxiety in financial circles, but the dangers have been seen, and will, in all probability, be averted. With a sane financial policy and the development of sounder methods among the less important industrial concerns, Japan should be able to retain the high position to which she has attained in recent years.

(Note.—The latest telegraphic news from Japan shows that the above-mentioned anxiety in financial circles was justified, as

a serious slump has now taken place, and the prices of many commodities have dropped heavily.)

FOREIGN TRADE.

Before the War there was always a balance of trade in favour of imports, but on the disappearance of German and Austrian goods from the markets of the world and a steady decrease in the supply of British manufactures and goods from Allied and neutral countries in Europe, Japan seized the opportunity to fill the demand. In particular she increased her exports to Java, India, China and Hongkong, and subsequently she found Australia, South Africa and South America growing markets for her goods. So rapid was her outward expansion, once the disturbing influence of the outbreak of hostilities had passed away, that the adverse balance of Yen 4,634,264 in 1914 was in the following year turned into a favourable balance of Yen 175,857,059.

These fortunate conditions continued throughout the War. In 1916, 1917 and 1918 the excess of exports over imports mounted to Yen 371,040,208; Yen, 567,193,941 and Yen 293,956,835 respectively. The actual figures for the years 1914-1919 were :—

	Exports	Imports	Total.
1914 ...	591,101,461	595,735,725	1,186,837,186
1915 ...	701,306,997	532,449,938	1,240,756,935
1916 ...	1,120,468,118	756,427,910	1,883,896,028
1917 ...	1,603,005,048	1,035,811,107	2,638,816,155
1918 ...	1,962,100,668	1,668,143,833	3,630,244,501
1919 ...	2,098,872,617	2,173,459,880	4,272,332,497

As has already been remarked, the approach and actual conclusion of the Armistice in November, 1918, immediately affected the flow of orders for Japanese and inward; heavy cancellations of orders for Japanese manufactures were reported from such countries as South Africa and Australia, which looked for the re-entry of British and other European goods, and Japanese importer of industrial raw materials hastily adopted a policy of marking time. Towards

the middle of the year 1919 trade revived, and the close of the year saw the total volume of trade exceed Yen 4,000,000,000.

Exports amounted to Yen 2,098,873,000, and imports Yen 2,173,460,000; thus for the first time since 1914 an adverse balance has been recorded. It is hardly necessary to mention the obvious reasons for this reversion to former conditions—Japan's export prosperity was created by the War to supply depleted markets, and automatically decreased on the release of commodities from belligerent countries and neutral countries bordering on the actual theatres of war. Further, the European demand for direct and indirect war supplies and foodstuffs diminished and then practically ceased.

EXPORTS.

During the War the following goods were shipped in large quantities to the Allies, particularly Great Britain and France, for direct or indirect military purposes :—

Copper, antimony, tungsten, graphite (chiefly to the United States of America for ultimate use in France), fish oils, starches and other subsidiary foodstuffs, waste and raw silk and habutæ, cotton tissues, cotton waste, and chemicals.

Other articles which showed a big increase were :—

Sugar, beer, cotton crepe, cotton flannel, cotton hosiery, European and Japanese paper, coal, iron and steel manufactures, porcelain, glassware, enamel ware, cement, electrical goods, brushes, and matches.

Of the foregoing articles, those which are most likely to retain their position are beer, cheap cotton hosiery, glassware, brushes and matches. The reappearance of foreign competition will, of course, affect the demand for Japan's output, but if present quality and relative prices can be maintained, the hold

on markets in India, Java, China, and South America should not be lost.

Turning now to the year 1919, the trade of which this Report is more particularly intended to review, it is noticed that the chief articles exported were finished goods such as cotton tissues, woollen tissues, silk tissues, silk handkerchiefs, cotton hosiery and other knitted goods, hats, buttons, matches, porcelain, paper, glass and glassware, tooth brushes, mats and matting, leather manufactures, umbrellas and toys; foodstuffs (namely beans and peas, marine products, tea, sugar, canned goods, rice, and beer); raw materials and semi-manufactured goods, namely, raw silk, silk waste, cotton yarns, plaits and hats and camphor; minerals, namely, coal, copper and zinc.

It should be observed that while exports have increased slightly in value they have decreased in quantity. The reasons for this decrease are that (1) the ratio of advance of prices has been greater in Japan than in other countries; (2) owing to the prevailing economic boom the purchasing power at home has increased to such a degree that it has been impossible fully to meet the demand from abroad; (3) the European demand for foodstuffs and military supplies has decreased very considerably; (4) European competition has been released.

Exports to China increased considerably in 1919 in spite of the boycott, which started in May and continued with varying intensity throughout the year. This was due largely to the extraordinary rise in the prices of silver and the consequent increase in China's purchasing power. The class of goods principally affected has been finished articles such as toys, soap, looking glasses, refined sugar, patent medicines, umbrellas, etc. This indicates growing industry in China and the reappearance of foreign manufactures, for the Chinese would naturally direct their boycott activities into channels where the least economic evils would be felt. In 1918

exports to China totalled nearly Yen 360,000,000; they amounted to Yen 447,000,000 in 1919.

COST OF LABOUR.

Many writers and speakers in England dwell on the cheapness of labour in Japan and the danger of Japanese competition in foreign and colonial markets, but certain counteracting factors appear to be left out of consideration. It is, of course, true that Japanese labour is still, in spite of great advances in cost, considerably cheaper than labour in the West, but the comparative efficiency is much lower. Under the most favourable conditions the ratio is not higher than 2 to 3, and many writers place it at 1 to 2. In addition to the lower efficiency and increased cost, it must be remembered that working hours are being reduced, partly as a result of the demands of labour and partly in accordance with the decision of the International Labour Conference at Washington. Further, it should be realised that the handling of machinery, generally speaking, leaves much to be desired, and also that labour-saving devices are at present comparatively little used, but this defect will doubtless be remedied as the cost of labour increases. It is therefore open to doubt whether the actual cost of production of competitive goods is lower in Japan than in England; in any case, it is submitted that the difference in favour of Japan is not enough to justify alarmist views, which find wide expression in Great Britain and her Colonies.

RAW MATERIALS.

Japan is singularly deficient in raw materials, and depends on foreign supplies for most of her industries. Raw silk she has in abundance, camphor and sugar in Formosa, copper in the main island. There is at present plenty of coal, but it is expensive, and the problem of future supplies is already engaging the attention of industrialists. Rich deposits in Formosa are being worked,

but these are not likely to supplement the output of Japan proper in sufficient measure to keep pace with the ever-increasing demand. There are very few iron mines in Japan, and practically all supplies of ore come from abroad, chiefly from China. In addition to coal and copper, which are the only important mineral products of Japan, gold, silver, lead, antimony, manganese, graphite, tungsten, sulphur and petroleum are found.

Coal is found chiefly in the island of Kyushu and in the Hokkaido; the Kyushu fields of Chikuzen and Buzen (called Chikuho) supply 75 per cent and the Hokkaido field 10 per cent of the total output, which amounted to 28 million tons in 1918. According to a report of the Mining Bureau of the Department of Agriculture and Commerce, the available resources aggregate over 800 million tons, calculation being made mainly on seams lying not more than 2,000 feet below drainage level. Seams lying at greater depth but judged equally workable are estimated to yield nearly 3,000 million tons.

Gold, tungsten and graphite are found chiefly in Korea. Sulphur occurs everywhere, but only the high grade deposits are worked.

Petroleum, found principally in the Prefectures of Niigata and Akita, bordering on the Japan sea, has increased considerably in output since 1914, largely owing to the success of deep boring. At present 50 per cent of the lamp oil demand is supplied by the United States of America and Java. The two principal native oil companies are the Nippon and the Hoden. The only foreign companies operating are the Rising Sun Petroleum Company (British) and the Standard Oil Company of New York.

ECONOMICS IN THE WEST.

The Great Coal Controversy.

London, 23rd September, 1920.—As I wrote, the last words are being said in the great coal controversy which has almost monopolised the attention of the country during the past few weeks to the exclusion of other topics, some of considerable seriousness. What that word will be I will not attempt to forecast, but however the decision may go it is certain that we are on the threshold of great movements in the industrial field. The position of affairs indeed, is such either that there will be a great explosion with far reaching consequences or that, as has many times happened in our history the disputants in the struggle reach some concord at which will ensure a durable and profitable peace. The weakness of the position at the moment is that the extreme doctrines of Bolshevism have taken the fancy of many of the younger generation of workers and that this section is most active and valuable in every trade dispute, carrying, or I should say, dragging with them the older and more sober elements of the industrial community. We have seen this markedly in the present dispute in the mining industry, and the same characteristic of exuberant youth at the prow directing the Labour ship was manifested in the proceedings of the recent Trade Union Congress. But, happily, there are signs of a reaction from extremism in many directions, notably in the public utterances of such prominent Labour leaders as Mr. Thomas and Mr. Clynes and in the scathing denunciations of the young men in a hurry which the veteran Socialist, Mr. Blackford is weekly pouring out in the columns of the Sunday paper to which he contributes the most conspicuous feature. I believe that the other Labour representatives have become thoroughly alarmed at the injury which is being done

to their cause by its association with the wild cat propaganda of our British Lenins. They know, as every thinking man knows, that the principles or lack of principles of the Russian dictator are absolutely alien to the British temperament and that a continuance of the policy which has recently been pursued—the setting up of the Direct Action Council and the rest—would irremediably damage the cause of Labour in the country. It has to be seen to what extent the moderate men may be able to regain control of the machine. But that there will be a return to sanity on the part of the great mass of industrialists at an early date I do not for a moment doubt.

FOREIGN COMPETITION.

One factor which is hastening and in the near future will still further accelerate the growth of moderate views is the increasing slackness that is coming over trade. Short time is now becoming quite common in manufacturing industry and side by side with it we are hearing lamentations from traders as to the impossibility of meeting foreign competition on equal conditions. So severe is the pinch in such trades as those associated with gloves and hosiery that the government are being asked to take exceptional measures to prevent the country from being flooded with goods, mainly of German origin, with which our home producers cannot compete owing to the enormous advantage that Germany gains by her low exchange. The call probably will not fall on deaf ears, but no amount of official protection will save the country in the long run from the consequences of the era of extravagant costs and low production which the Armistice ushered in in many directions. For some classes of goods the world having satisfied its urgent needs is looking askance at the high priced British article and is seeking elsewhere for something more suitable to its pocket. Political economy, unfortunately, is not a strog line with our working men and

it is difficult to convince them that there is something terribly wrong with a creed which exalts low production. But the stern logic of events will help to their enlightenment before we are very much older. The coal dispute has been a splendid object lesson for many. For the first time it has dawned upon them that increased output is vital not merely to the coal trade but to every other industry and, in fact, to the country's commercial position. A drop in American exchange representing an additional penny in the shilling on our food supplies from abroad was due merely to the threat of a strike. It is now easy for the man in the street to understand why diminished production makes for the high cost of living and how intimately the nation's prosperity is involved in the amount of coal that can be sent abroad in exchange for food products and raw material. Valuable as the instruction has been there is still abundant room for a wider diffusion of economic truth. It is too much the fashion to regard Britain as a self contained entity which can make its own industrial laws regardless of what is happening outside. The working man is not the only sinner in this respect. Recently the *Times* published a long and interesting letter from an eminent writer on economic subjects sketching wage movements in England during the past seven centuries and showing that in the past six years wages have risen 320 per cent. In conclusion he says "the lesson taught by these investigations is undoubtedly that wages when they have once risen never fall It is false optimism to believe that the near future will show us a return to old conditions. Unless we permit foreign dumping, the only true solution is to fix a fair rate of wages in all trades and determine that this shall not be increased. History shows that only by stabilizing the controlling factor—wages is it possible to fix the price of commodities. When any increase has been sanctioned it must be realized that such increase has

brought us to another rung in the ladder of wages, of which the lower rungs have been for ever destroyed. "The writer's calm assumption that the existing extraordinary scale of wages will never be reduced is an example of insular short-sightedness equal to that of the coal miner who thinks that he can drive his emoluments upto any point he cares to fix without danger of a subsequent reaction. It practically ignores the factor of foreign competition. True, there is the proviso in regard to dumping, but no legislation against dumping would protect our manufactures in foreign markets, or even in our overseas territory from the effects of the low costs of production in other countries. We already see Japanese, Chinese and Australian coal being imported to Europe because our system of artificially high wages and diminished production have prevented the sale of our own material. That movement is bound to go further and affect all our industries if the existing conditions continue. Our industrialists are in competition with the whole world for many of our goods and necessarily wages here must have some relation to wage payments elsewhere. German competition is already becoming active. What it will be later when the conditions are more settled in Europe we may well imagine. But it is in the East that the greatest industrial influences of the future must be looked for. You in India are buckling on your industrial armour to some purpose. Japan is virile and aggressive in commerce, and China is awakening from the sleep of ages and beginning to put forth her immense strength. In such circumstances it is folly to compare the results of to-day with those of earlier centuries when the conditions were profoundly different, and draw definite conclusions from them. It would be much safer, it seems to me, to regard the present high wage movement in this country as a temporary phenomenon due to the abnormal circumstances of the war—a phenomenon which will pass when the life

of the world once more flows in its ordinary channels.

NEW SOURCES OF GENERATING HEAT AND POWER.

Our coal troubles have led to a fruitful discussion of the necessity of economising existing supplies and the possibility of finding new sources of generating heat and power. In regard to the former section of the subject action is being taken by the federation of British Industries to obtain information as to the means available for using coal to greater advantage. A good deal of apathy appears to exist amongst manufacturers in the matter. They have so long been accustomed to cheap and abundant coal that they are not immediately impressed with the necessity for a change of method. But that all industrialists are not of this temperament is revealed by a letter from a prominent midland firm setting forth the advantages it had reaped from attention to coal consumption. According to the communication in two small works under the firm's management a saving of upwards of £2,500 a year was effected by scientific control and selection of more suitable coal. In another case—that of a large business employing many thousand hands and possessing a central electric generating station producing current at 7d. per unit the cost, by scientific control was reduced to 36d. per unit without any additional plant. No doubt with proper arrangements these economics might be made general and a vast reduction in the coal consumption of the country effected. On the other phase of the subject we have to hand much information to show the extent to which oil is replacing coal in our transport system more particularly. Thus at the launching of a great South American liner at Messrs. Vicker's yard at Barrow a few days since Sir James Mc. Kechine, a director, said that while coal at the present price would only carry six pounds of meat from South America to this country, it would be possible with the use of oil

engines—owing to the greater economy of space which they use ensures to carry 10 lbs. of meat the same distance. He looked forward to the day when all ocean steamers would be oil driven. In much the same vein Sir John Cadman, speaking a little later at the annual meeting of the Institution of Mining Engineers, referred to what he termed "the new era of fuel." Coal, he pointed out, was no longer holding its own. The navy and mercantile marine were tending to run entirely on liquid fuel. "It was," he said, "being found more suitable to use coal in liquid form. This country would have before long to consider the utilization and re-arrangement of coal constituents so as to conform with the new era." The voices of these experts are worth listening to. The day of coal is doubtless not yet done even in its crude form, but to an increasing degree it will have in the future to compete with other agencies and be compelled to conform to the dictates of commerce based on a preference for oil.

Yet another manifestation of the trend of modern industry in the matter of fuel is supplied by the measures being taken to discover alternative sources of power to petrol for motor propulsion. Professor Harold R. Dixon, F.R.S., under government auspices, has made the subject one for thorough scientific investigation and has come to certain conclusions which will probably bear fruit after they have been fully expounded, as they will be, at a great meeting of motorists at the Royal Automobile Club on Oct. 18. Professor Dixon has strong predilections in favour of alcohol as an alternative to petrol. His researches have related to the physical properties of alcohol mixtures with air and oxygen as compared with petrol pure pentane benzol and ether. It has been shown that alcohol vapour can be compressed much more highly without danger of ignition than the other vapours, and experiments are now being made with alcohol to which other

vapours are added in order to discover the mixture which is sufficiently volatile to give an explosion at ordinary temperatures and yet will stand a high degree of compression without premature ignition. In a conversation with a representative of the *Times* to whom he communicated these facts, Professor Dixon expressed the view that alcohol would come into large use. It would not, he thought, supersede petrol, the latter having advantages for high speed engines that alcohol did not possess, but its use for ordinary commercial purposes would be wide and would certainly tend to bring down the price of petrol.

THE NEW HIGH COMMISSIONER FOR INDIA.

Sir W. Meyer's appointment as the first High Commissioner for India is an event of no ordinary importance in the history of India's economic relations with Great Britain. It imports, no doubt, a new departure not merely in political development, but an advance on new lines in matters of trade. If precedent is followed, the New High Commissioner for India will not hide the light of his department under a bushel in Whitehall. He will come into the open as the High Commissioners of Australia and New Zealand do and open his shop either in the strand or some other prominent thoroughfare and show stay at home people for the first time what modern India is like and what it can do in matters of trade. I suppose such an enterprise would be enough to make some of the old order of civil servants tour in their graves; but of its practical value there is no room for doubt. The shop window diplomacy of the Dominions, indeed, is a far more promising thing than ever was the shirt sleeve diplomacy of Washington.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

Gas now being made from Straw.

Washington, D.C., U.S.A., Sept. 24, 1920.—

A gas obtained by the destructive distillation of wheat, oat and rye straws is now being produced upon a considerable scale at the experimental farms of the United States Department of Agriculture. Although automobiles are being operated with the new combustible, and it has been for some time used for illuminating purposes as well as for cooking, the possibilities of straw gas are as yet far from being fully determined, says the department. In order to fully determine the exact commercial and industrial value of the gas the government scientists are now engaged in conducting an extensive series of experiments.

For a number of reasons, the work of experimentation can be carried on but slowly at this time, but it is planned to do much that will determine the quantity and nature of the gas that may be obtained from wheat, oat, barley, rye and rice straws, as well as from cornstalks, corncobs and other vegetable matter usually burned as waste. If the results of the present tests warrant further investigation the experiments will be at once extended to the problem of plant equipment for producing the gas on a scale sufficient to allow the farmer to supply light and heat for his house, power for stationary engines and, possibly, for his tractor from a small individual outfit. If a suitable unit can be constructed so that the farmer's initial cost will be small it seems likely that the straw gas will have a very considerable economic value in sections of the country where the raw material from which the gas is made is now considered as waste and burned or left to rot in the fields. In some sections of the United States the straw is used as fertilizer, but in the west and north-

west there is an unlimited supply of the material available for conversion into light and fuel for the farm home as well as for industrial and commercial purposes along almost unlimited lines.

While it has been found possible to operate automobiles and auto trucks with the straw gas, and it is known that fifty pounds of straw will produce about 300 cubic feet of gas—which is an amount sufficient to drive an ordinary automobile roadster for fifteen miles the problem of reducing the gas to liquid form or condensing it sufficiently to allow it to be carried conveniently is an essential one which must be satisfactorily solved before the straw gas can be considered as a standard motor fuel. This is another of the tasks in this connection being taken up by the engineers of the Department of Agriculture.

Interesting as is the subject straw gas is not a new thing. The present process was discovered and developed to an extent by George Harrison, a Canadian engineer, at Moosejaw, in 1914, who later co-operated on the project with Professor MacLaurin, of the University of Saskatchewan, Saskatoon, Canada. This university, in conjunction with the United States Department of Agriculture, exhibited a straw gas equipment at the Exposition of Chemical Industries in New York City during the fall of 1918. This equipment was really the starting point of the present series of experiments which are resulting in such interesting developments. The exhibit shown at the New York exposition referred to was purchased outright by the United States Department of Agriculture. The first tangible and practical result of the experiments was the running of an automobile with the product, which was done in and near Washington. However, in this case, the fuel supply was carried in a large flexible bag on the top of the car, a method of doubtful practicality as a general practice.

The experiments are developing that several very valuable by-products are being obtained in the process of manufacturing the straw gas. Carbon residue suitable for manufacturing lamp-black of exceptionally fine quality is one. This residue also contains certain amounts of potash, phosphates and nitrogenous compounds, all of which give it fertilizing value.

The tar and ammoniacal liquids resulting from the process, aside from their value as disinfectants and preservatives, will undoubtedly prove useful in the dyestuffs industry. If the engineers succeed in perfecting the present apparatus and in reducing the cost of production there is no doubt but that straw gas will prove to be one of the most important commercial discoveries in many years.

TURNING SMOKE INTO MONEY.

The United States sends billions "up in smoke" yearly because of the enormous waste in the fuel used by our industries. On the other hand, there is a man in Washington who has discovered how to turn smoke into money and he is now busily engaged in teaching the rest of the country how to perform the same trick. He does this by means of devices which, through electrical precipitation, not only reclaim vast wealth from the smoke, dust and fumes of smelters and other plants, but at the same time redeem thousands of acres of nearby land. As a matter of fact, the curb which he has put upon the smoke and dust nuisance—which was his original aim—now actually bids fair to be, in some directions, the primary reason for the running of certain of our industries. The smoke wizard who has accomplished these remarkable things is Dr. Frederic G. Cottrell, chief metallurgist of the U.S. Bureau of Mines.

Dr. Cottrell's experiments began several years ago when a member of the staff of the University of California, he was called upon to solve the problem of helping a smelter located in San Francisco Bay. The waste

gases and vapors from this smelter, resulting from the sulfuric acid parting process used in treating gold and silver bullion, were declared a nuisance by neighbouring farmers and seemed likely to provoke costly litigation and possibly lead to a shut-down of the plant.

The gases discharged into the air amounted to substantially 5,000 cubic feet per minute and held in suspension an important proportion of sulfuric acid in the form of a fine mist. The corrosive action of the acid, swept broadcast by the shifting winds, was felt throughout the entire zone and both the agriculturists and the people generally had ample reason for complaint. The smelter was a profitable one and the management was anxious to find some way to abate the nuisance that was both a menace to health and hurtful to vegetation.

Dr. Cottrell's preliminary work brought up some puzzling situations. Up to a certain stage matters went well enough on the miniature scale of the investigational tests, but beyond this was the question of meeting the practical situation presented by a large commercial smelter. A big part of Dr. Cottrell's achievement lay in spanning the gap between the laboratory and the industrial plant and in finding ways to control the enormous pressures of the necessary electric current, mounting up to 100,000 volts.

The problem was solved, however, and so well was the precipitator installed at this smelter designed that it has been doing satisfactorily ever since. Further, by mere chance, Dr. Cottrell attacked at that plant what is commonly admitted to be the most difficult of all problems of smoke or fume abatement: the precipitation of acid mist.

The good results obtained in this first instance soon became widely known and a new line of application was opened a short time later when a great California copper smelter was threatened with fume litigation by the United States Forestry Service. Fume, or fine particles in the form of smoke,

and sulfur dioxide gas, invisible to the eye, given off from the stacks of the smelter, had swept the neighboring country bare of vegetation for miles, and it was a case of either a shut-down or a suppression of the destructive discharges. A full sized plant of the Cottrell type was, accordingly, installed. The volume of the gas treated averaged between 200,000 and 300,000 cubic feet per minute, and during the filtration tests made throughout a period of nine months it was found that the electrical precipitation recovered between 80 and 90 per cent of the suspended matter. With later improvements in details of construction the efficiency was raised well up into the nineties.

The general public has only the faintest notion of the wastage represented in the fumes and smoke from belching stacks, quite apart from the beneficent economies following from the abatement of out-pourings harmful to man and vegetation. In the smelting of lead the fume contains anywhere from three to ten per cent of the volatilized metal in the form of lead oxide and lead sulfide, with compounds of arsenic and antimony. This percentage is well worth recovering. Dr. Cottrell is authority for the statement that during the smelting and refining of various ores not less than 36 valuable substances are found in fumes which, if not collected, would be lost.

About all that need be said in description of Dr. Cottrell's method is that he demonstrated that the mere presence of an electric current would cause free particles of foreign matter to be precipitated from a gas. That, with the development of means for applying and controlling the current and for collecting the precipitated dusts, is literally all that there is to it. Seldom, indeed, has so simple a discovery led to such wide consequences.

THE GREAT LOSS FROM RUSTING OF METALS.

It is now quite universally admitted that the rusting of iron and steel is one of the most serious industrial problems of the age.

If we assume an average life of steel to be 33 years, as is usually the agreed-upon figure, the depreciation charge of 3 per cent represents, according to experts of the United States Bureau of Mines, a yearly loss of more than one million tons of product in this country for the crude or semi-finished material alone, exclusive of correlated manufacturing costs.

The inevitable rusting of steel may be claimed, and justly, to be the mainstay of the zinc industry, as 60 per cent of the metallic zinc used in the United States is for galvanizing iron and steel articles, representing an annual outlay of over \$ 20,000,000 in the endeavour to protect metals from decay and rust. Enormous amounts of paint are used in a like endeavor. About five million tons of coal are needed in the production of steel to replace the annual waste, and one million tons more for replacing the zinc that is annually lost. No possible estimate can be made of the value of brass, bronze, copper, aluminum, nickel, tin, and other metals and alloys used in machine parts, as sheathing, for plating, etc., to protect steel, or as a substitute for it in places where it would be used, but for its lack of resistance to atmospheric attack.

MOTOR CAR EMERGENCIES.

Comparatively little skill and practically no technical knowledge are required to enable a person to drive a motor car under ideal conditions. The real test of motoring qualifications comes with the unexpected situations.

Recently, an owner-driver stalled his engine on one of the busiest New York City street crossings. When he kicked his starting motor pedal the engine-cranking mechanism failed to respond, due to a run-down storage battery. The frantic search that followed failed to disclose a hand-starting crank in the tool box or under the seat. In disgust the traffic police officer helped to push the crippled machine to the curb. Just

then a young man stepped out of the crowd and offered his assistance.

"If your engine is all right," he suggested, "I think I can start it for you."

"Go ahead, if you can," urged the owner dubiously.

Picking up a jack, the young man raised one rear wheel from the ground and threw high gear into engagement. Then he turned the jacked-up wheel in a forward direction, being careful to pull up and lean away from the car. In an instant the motor was humming, and after throwing the gears into the neutral position and removing the jack the friend-in-need smiled his appreciation of the owner's copious thanks and went his way.

It was a simple plan, as most successful mechanical adaptations are when demonstrated.

Early this past summer a New England motorist found himself on a road several miles from the nearest garage with a flat front tire and no jack. Noting a fence rail at the side of the road, he selected a sound, straight piece of timber. Next he built a solid pile of stones two and one-half feet high in the road in front of his car. Then he laid the rail on the pile so that it made an angle of about fifteen degrees with the road, and ran his car up against the incline with sufficient force to raise the damaged tire clear of the road, and thus permit an exchange of rims. Having his rear wheels on solid ground it was a simple matter to back off from the improvised jack when the repair was completed.

AN IMPROVEMENT IN ELECTRIC WELDING.

Electric welding has two principal applications, the arc and resistance processes respectively, spot welding being a special modification of the latter applied to sheet work. These applications are well known in practice, but they are unsuitable for complicated work or for sections of irregular profile. For such work the so-called "fusion process" is now coming into general use in the United States. According to this process the two pieces to be welded are brought sufficiently

close to strike a series of arcs between them. The pieces are then gradually drawn together, so that the whole welding area appears to be enveloped in a shower of sparks, the sections being thus gradually melted in an even manner over the whole area to be welded. The current is then switched off, and the two pieces are then pressed together and united.

The advantages claimed for this process are that the ends to be welded need not be carefully trimmed beforehand, since irregularities are melted away in the process, and, further only a small ridge is formed at the weld. It is preferable to trim this level with a chisel while it is still red hot, but to avoid forcing the pressed-out portion into the welded seam it should not be hammered, as in ordinary butt-welding.

The strength of welds made by this process is claimed to be 98 per cent of that of the unwelded material, and the process can be successfully applied for welding tube strips or similar material, and especially for welding tool-steel cutting ends to ordinary iron or steel holders. In such cases, and for all large sections, it is advisable to bring the pieces to a red heat by using the current as in ordinary butt welding forcibly separating them if necessary with the current switched off before separating the fusing process.

TWISTING EGGS IN PAPER FOR MAILING

The safe delivery of eggs to be sent through the mails will be insured and their period of freshness prolonged at the same time by the use of a new system which has just been patented and is now being called to the attention of egg dealers and shippers. The patent is on a machine which wraps the eggs in a long strip of paper, the eggs being entirely covered by the paper which is twisted about them, making them resemble a length of sausages more than anything else. The paper in which they have been encased has been dampened, and in this condition the eggs are draped around a collapsible wire frame. When they are placed in a box for shipment they are supported so that they cannot come in contact with each other nor the box, and they are thus enabled to withstand a rough experience which would be disastrous under ordinary conditions.

ALFRED T. MARKS.

NOTES.

In the House of Commons the other day Mr. Tillett asked the Prime Minister whether his attention had been drawn to a statement made by the American Comptroller of Currency that 35 billion dollars, or more than three times the total banking power of the whole world in 1890, belonged to the United States of America; that the banking power of the United States of America had grown more in the last seven years than in the entire century and-a-quarter which elapsed from 1789 down to 1913; that that country had been swiftly transformed from a debtor nation, owing to the rest of the world, as it did in 1914, some four or five billion dollars, into the world's greatest creditor; that the total reserves of the national banks of the leading countries in the world, including the Bank of England, the Bank of France, the Bank of Italy and the national banks of Spain, the Netherlands, Belgium, Norway, Sweden, Denmark, Switzerland, Roumania, Japan, Germany and Austria-Hungary, aggregated at the normal rate of exchange approximately 51 billion dollars, but at the present rate of exchange were worth, in American money less than 12 billion dollars, which was about one-half of the reserves of the great national banks of the United States of America alone, exclusive of the reserves of their federal reserve banks; and whether the government were keeping these facts in mind in shaping their national and international policies. Mr. Chamberlain, who replied, said:—The figures quoted by the hon. member do not correspond very closely with those that I have seen nor does a comparison between the national bank of the United States of America and the national banks of other countries named seem to me very instructive, as the institutions, though described by the same name, are very different in character. As regards the last part of the question, the government endeavour to keep all pertinent facts in mind in framing their financial policy. Perhaps I may be allowed

to add that, whilst not accepting the comparison suggested in the question, we can afford to view not only without jealousy but with satisfaction the growth and improvement of banking in other countries.

A meeting of the Full Board of the U. P. Board of Industries was held at Lucknow on the 6th October. Among the questions discussed was the scheme prepared by Mr. Ormerod for the introduction of more peripatetic weaving schools in place of the districts weaving schools. Though the Board approved the scheme generally, they were not prepared to recommend the discontinuance of the district weaving schools at the present stage. It was then decided to request Government to form a Committee of Enquiry to go into the matter with special reference to the feasibility of introducing the co-operative movement for the benefit of the weaving classes. The Board also considered the question of an All-India Chemical Service proposed to be instituted by the Industrial Commission. The Board after full discussion resolved that they were opposed to the institution of such a service and considered that it should be left to the local Government to decide how they should fill Chemical posts under their control. The next important item which was considered by the Board was the award of State Technical Scholarships under the Reforms Scheme. They agreed to the proposal that in future these scholarships should be provincialised. In this connection the Board also endorsed the proposal of the Secretary of State for India regarding the increase of the deposit for initial expenses from £15 to £40. The Board approved the proposal to increase the staff of the Factory Inspection Department of this province. The Board generally approved of the principle of providing facilities to short-time experts coming to India to demonstrate by the medium of demonstration factories the advantages of improved methods of manufacture.

The Comptroller of the Currency at Washington has just issued a report on the National Banks of America. On May 24, 1920, the number of deposit accounts in the national banks of the United States reached a total of 20,380,350, an average of one deposit account for every $5\frac{1}{2}$ members of the population, which shows an increase of 165 per cent in

ten years. Pennsylvania heads the list of States in regard to numbers, New York coming second with 1,681,581 accounts. The resources of the national banks on May 4 aggregated \$22,038½ millions, a record total with the single exception of December 31, 1919. Individual demand and time deposits on the same date stood at \$13,534 millions, the ratio of loans and discounts to deposits being 72·61 per cent, as compared with 62·28 per cent. a year ago. Loans and discounts on May 4 amounted to \$12,288½ millions, an increase of \$294 millions since February 28, 1920. During that period the reserve and centre reserve cities of the country outside of New York City showed a net reduction in loans and discounts of something less than \$2 millions.

A London Correspondent writes:—Wood-blocks as a method of road construction are rapidly losing favour within the city and the West End, and at the present moment many streets hitherto laid with blocks are being resurfaced with an asphalt substance. This material is a bituminous asphalt made by the mixture of bitumen, the solid constituent of oil, with very fine sands and "filler." It is being laid on the existing road foundation in two layers, the bottom usually just over three inches thick, called the "binder course," being mixed with broken granite or stone, and the top of "carpet" being one inch and a half in thickness and mixed with fine sand to give a smooth surface. The work can be done so quickly, in comparison with wood-paving, in which process it is necessary to wait for the cement foundation to dry, that the two layers can be laid simultaneously, and the road opened piece by piece to traffic a few hours after completion. Incidentally—a point of interest to surveyors—the cost, apart from the question of foundation, is about half that of wood blocks.

According to the Department of Statistics of India, 1,165 motor cars were imported into British India during August, 1920, of which no less than 916 were consigned from the United States, 139 from the United Kingdom and 32 from Canada. The number of motor cars imported during the five months April, to August 1920 was 6,457, valued at Rs. 252 lakhs, as against 2006, valued at Rs. 58 lakhs in the corresponding period of 1919. Of these 6,457 cars, 4,931 were shown to have come

from the United States, 755 from the United Kingdom, 542 from Canada, 42 from Italy and 25 from France. The country of origin of many cars shipped from the United States is, however, Canada, Bombay imported 2,408 Bengal, 2,226, Madras 844, Karachi 495 and Burma 483.

A London Correspondent writes:—I was shown a watch this week—a sample that had been sent to London by a Swiss firm. Certainly it was not a thing of any very great beauty or delicate form, but it ticked with apparent regularity, and its hands, when I saw it pointed approximately to the correct time. In other words "it went." These watches are being offered by this Swiss concern at the amazing wholesale price of 2s each, or at a price which should mean to the general public a watch cheaper even than the "bargains" which were regular features of all the Strand shops, where, before the war "compulsory sales" were in progress all the year round. One wonders, however, if the manufacture of these watches is undeniably Swiss.

There is a lake in British East Africa—Lake Magadi—that is famous for its vast deposit of soda. Ordinarily the lake looks as if it were frozen and covered with a coating of snow partially thawed, then frozen again. The temperature gives the lie to this appearance of roughened ice, for the heat is extreme, and at midday almost unbearable. The soda burns one's feet even through the shoes, and the sharp frosty spikes will pierce any except the thickest soles. The lake contains millions of tons of soda deposits, and both surface and underground streams of saturated soda liquor continually feed it. The present supply is enormous, and as fast as it is removed a new surface, formed from the mother liquid beneath, replaces.

The *Daily Gazette* of Karachi, which devotes two leaders to Dr. Gilbert Slater's review article on Mr. Moreland's book published in the issue of our *Journal* for August last, calls it a "very excellent one." It draws pointed attention to the comparison it institutes between Akbar's India and Modern British India.

GLEANINGS.

The average wholesale price of wheat in the Punjab in August rose slightly to Rs. 5—2—0 per maund, the rise being mainly due to the early cessation of the monsoon. The average wholesale price of gram also rose slightly to Rs. 5—9—0, the rise being almost general.

The area sown with groundnut up to the end of September 1920 is estimated at 1,041,500 acres which is about 13 per cent above the estimate of 91,93,000 acres made on the corresponding date last year. The increase is due to the high prices obtaining for the crop.

The output of sugar in Jamaica from this year's crop will probably be 15 per cent below last year's amount, owing to the effect of droughts. The tobacco crop has suffered severely from the same cause, and the demand for irrigation in the plains is gathering strength.

An agreement has been concluded between Argentina and the United States, providing that any American commercial traveller may carry on business throughout the provinces of Argentina on payment of a single licence.

An agreement has been concluded between Argentina and the United States, providing that any American commercial traveller may carry on business throughout the provinces of Argentina on payment of a single licence.

The area planted with Sugar-cane up to the end of September 1920 is estimated at 92,100 acres which is only about 5 per cent below the estimate of 87,900 acres made on the corresponding date last year.

Cuban railways are being equipped for oil burning, but the island is much in need of

rolling stock, and the 5,000 cars which it has borrowed from the United States are about to be called in.

Sir Liege Hulett, the leading sugar-cane and tea planter in Natal, declares that the local tea industry is dying for want of labour, and that in a couple of years' time there will probably be no tea grown in the province.

From October 23 to November 2 the Czecho-Slovak Aero club will hold the first International Aeronautical Exhibition in Prague under the patronage of President Masaryk.

At the request of the Chamber of Commerce of British Guiana, the Governor of the colony has appointed a committee to inquire into causes of the increased cost of living.

Emigration from the British West Indies to sugar estates in Cuba and Santo Domingo is continuing. From Jamaica alone labourers are going to Cuba at the rate of nearly 2,500 monthly.

One hundred thousand francs (£2,000) annually will be contributed by the Chinese Government towards the maintenance of the Chinese Institute at the University of Paris.

British capital is to be invested in British Guiana in purchasing large tracts of land for the cultivation of cassava. Active operations will be commenced early next year.

An inhabitant of Mayence has discovered a method of securing by the combination of electrical and hydraulic energy and inexhaustible supply of heat without coal.

It has been decided to remove the restrictions on exportation from Australia of sheepskins, wool tops, wool noils, wool waste, and manufactured woollen goods and yarns.

Senor Aguirra Prigio, the Ecuador Foreign Minister, has officially declared that yellow fever has completely disappeared from Guayaquil and the Guayas Valley.

Direct regular wireless telegraphic communication has been established between the Karlsborg Station in Sweden and the San Paolo Station at Rome.

During the 10 months to the end of April, exports from South Australia amounted to £15,444,006, an increase of £8,163,698 compared with the previous year.

Of the 200 returned soldiers who have been training for the teaching profession in Ontario nearly all were successful in passing the courses prescribed for certificates.

The passenger and goods air service between Paris and Geneva has been in full operation since the beginning of July. Fares are 900f, single and 1,350f. return.

For charging excessive prices, three Metz shopkeepers are to have announcements of their convictions published daily for a week in the local Press.

As sugar, reserved for home consumption, at special prices, has been exported from Barbados, imprisonment is now the penalty for this offence.

State control of the corn trade in Sweden has been discontinued and thus the last of the Swedish wartime restrictions has now disappeared.

Moscow reports that the first electric train in Russia has been built in the Baltic Works, and that it will have a speed of 31 miles an hour.

A conference of nurses of the northern countries will be held at Stockholm to dis-

cuss the questions of an light-hour day and salaries.

Hydro-electric power schemes, to cost 10,000,000 yen, which will take three years to complete are being set on foot in Korea.

Arrangements are being made for organizing an air service between Mahe and the various islands of the Seychelles group.

The Australian Government's prohibition of the export of sheepskins, fabrics, woollen yarns, and wastepaper has been revoked.

Two sugar concerns operating in Formosa recently declared dividends of 100 per cent, and another company 108 per cent.

Formosan sugar interests have bought up a large proportion of the Java crop and profits are stated to be enormous.

An aerial mail service between Mexico City and Tampico is to be established by the Mexican Government.

Owing to the shortage of coal in Canada, a number of industries have had to close down for a time.

Montreal sugar refiners have decided to lower the price of sugar from 1s. 2d. to 1s. 1d. per pound.

Direct wireless communication has been established between Rome and Sao Paulo, Brazil.

Brazilian exports for the first half-year of 1920 amounted to £66,677,000 and imports to £51,021,000.

At East St. John (New Brunswick), one of the largest dry docks in the world is under construction.

Arrangements are being made for British and Danish universities to exchange students.

ECONOMIC NOTES.

SWISS WATCH-MAKING INDUSTRY.

The Acting Commercial Secretary to H. M. Legation at Berne writes :—

The most prosperous Swiss industry in 1919 was the watch-making industry. Statistics for the first quarter of 1919 showed an increase in the value of exports, amounting to 21·2 per cent, and during the second quarter an increase of 26·73 per cent, as compared with the corresponding periods of 1918. The total value of watch exports from Switzerland for the first half of 1919 amounted to 128,387,701 francs, compared with 101,774,432 francs for the first half of the previous year. It must be noted, however, that there has been a marked decrease in the export of Swiss watches since January of the present year, and during the last three months in particular there has been a crisis in the production of the cheaper qualities, unemployment and half-time working being on the increase. In the output of gold watches, however, there is no sign of reduced business, in spite of the import prohibitions of various countries.

EXPORTS TO THE UNITED STATES AND UNITED KINGDOM.

As regards the actual number of watches exported, and compared with the same periods, the statistics show a diminution of 347,246, or 4·2 per cent. This reduction chiefly applied to finished watches. On the whole, exportation to the United States of America was not quite so large as in the foregoing year, and here, again, the number of finished watches exported was reduced, *viz.*, from 1,669,838, valued at 20,165,117 francs, for the first half of 1918, to 1,523,337, valued at 23,723,175 francs, for January-June, 1919. Exports to the United Kingdom declined still more, falling from a total number of 2,623,212 watches, valued at 20,235,572 francs, to 1,571,722, valued at 16,477,692 francs, in the periods mentioned above. These two countries—the United States and the United Kingdom—are the most important markets open to the Swiss watchmaking trade.

TRADE WITH OTHER COUNTRIES.

Business connections with Italy in 1919 improved un-expectedly, which may be explained by the fact that Italy had the advantage of having a more direct commercial intercourse with the East.

At the same time trade with France also developed to a certain extent, thanks to the modification of import restrictions, which permitted a larger quantity of goods to enter the country. On the other hand, the German Government prohibited the importation

of watches into their country, so that business with Germany, as also with Austria, practically ceased. Exports of watches to Scandinavia seem also to have diminished. On the other hand, there are indications that overseas countries are trying to complete partly-exhausted stocks.

MANUFACTURERS' DIFFICULTIES.

Although manufacturers have not the same difficulties to contend with as during the war, there are still obstacles to be overcome. These include the demands of the Workmen's Union with regard to wages and the length of working hours. The shortening of the hours of labour was partly counter-balanced by the increased use of improved machinery, which kept the rate of production at about the same level. Fluctuations in the rate of exchange afford another problem. Swiss manufacturers see themselves obliged to direct their attention towards supplying markets in countries where the rate of exchange enables business to be satisfactorily transacted.

The question of labour is at present the most difficult one to solve; it is hard to find a sufficiently large number of skilled workmen in order to execute the large number of orders coming in, especially in the Jura district, and new factories have been established in Geneva.

Watchmakers, more especially those who turn out highclass quality goods, may look with confidence into the future, all the more so as it is to be hoped that in the course of time countries with low rates of exchange, or in an unsettled political state, like Russia, will in time open their doors again to the Swiss watch trade.

INDUSTRIES AND COMMERCE.

Company Promotion in Bengal

The annual report on the administration of the Indian Companies Act in Bengal, by Mr. W. Stather Hale, O.B.E., A.C.A., Registrar of Joint-stock Companies, is of more than usual interest this time, the slap-dash boom of last year being the main burden of the song which the author sings. When the present office of the Registrar was established under the new Act of 1913 there were only 900 companies on the books. In Bengal there were 1,744 companies at the close of the last financial year, as compared with 1,267 on March 31, 1919; and with 444

companies added, which are established outside of British India, the grand total comes to 2,188. The paid-up capital with Rs. 53,77,82,688 in 1919-20, as compared with Rs. 45,66,63,797 in 1918-19.

The number of companies and societies registered during the year under review shows a remarkable increase over those of the previous twelve months. They were, indeed, no less than 328 in excess. They included 157 public and 107 private trading companies, total 264, besides 57 mining propositions, 73 tea and planting concerns, and 25 banking and loan corporations.

The rush of registration of new companies of an industrial nature resulted, the Registrar states, in a time of feverish activity on the Stock Exchange, shares being dealt in at large premiums even before the companies were registered, but this state of affairs came to a sudden end in October last. It is, however, interesting to observe that the registrations of the latter half of the year under review were greater than those of the first half, the figures being 294 and 238 respectively. Some of the enterprises inaugurated during the past year have undoubtedly bright and prosperous careers in front of them, others will pursue an even course of usefulness without achieving great results, but it is to be feared that not a few have been born but to fade away and sink into well-deserved oblivion.

The new banking and loan companies include several industrial banks formed with the object of supplying capital to trading concerns engaged in the development of commercial enterprise. If soundly managed, these banks should prove of considerable benefit to the community and their career may be watched with interest. Some insurance companies have been floated with ambitious programmes, and with business expanding there are great possibilities in the future; it will be interesting to observe whether their achievements correspond to their expectations.

The future of the new navigation and shipping companies is obscure, as they are liable to be subjected to severe competition. The exceptional prosperity of the jute and cotton trades has no doubt been the cause of the flotation of several new mills, and this notwithstanding the increase in price of land and cost of machinery and labour. The increase in the number of new tea companies may be attributed in a large measure to advantage having been taken of the prevalent speculative fever, and it is to be apprehended that some of the multifarious enterprises that have been launched have little prospect of ultimate success. Indeed the reflection is almost irresistible that the primary object in the inception

of those companies is the immediate pecuniary benefit of the promoters.

The difficulties, under which colliery business is being carried on at the present time, are only too well known; nevertheless there is a decided increase in this direction, also in the formation and development of new concerns. Among the trading companies will be found quite a considerable number with capital ranging from Rs. 5,000 to Rs. 50,000 established with the avowed objects of the regeneration of Bengal and the inculcation of business habits amongst the Indian inhabitants. As far as it is possible to judge 306 companies under Indian management were registered during the year under review as compared with 71 the previous year.

The Registrar concludes his report with an expression of regret at the increase that has taken place in the law cases that have of necessity been instituted against company promoters for the attempted ingenious evasion or positive disregard of the salutary provisions of the new Companies Act.

FORESTRY.

Empire Timber Exhibition.

The Department of Overseas Trade is to be congratulated on promoting the exhibition of timber grown within the Empire which was opened at the Holland Park Skating Rink on July 5th and closes on the 17th. To many people the wide range of these timbers will come as a surprise. A large number are hardly known in the United Kingdom; but even a brief study of the exhibition will satisfy one that there is scarcely a purpose to which timber can be put for which the Empire does not furnish a suitable tree.

Practically every timber-growing country in the Empire is represented either by an official exhibit or a private firm, or both. The Dominions of Canada, New Zealand and Newfoundland, the Indian Empire, the Governments of Western Australia, New South Wales, Tasmania, Union of South Africa, the Administration of British Honduras, British Guiana, Ceylon, Gold Coast, Trinidad, Fiji, Nigeria, and East Africa Protectorate are all exhibiting.

Specimens are shown both in the rough and in the finished state, polished and unpolished—everything from the sawn log to the carved panel, from a lead pencil in cedar to a railway carriage in teak. A feature of the Western Australian exhibit is a panelled

room and furniture made of jarrah (Western Australian mahogany or everlasting wood). The extraordinary durability of this wood is exemplified by various posts and rafters which show little sign of deterioration after periods of sixty years in the ground or root as the case may be.

A particularly attractive section of the exhibition is that devoted to the timbers of India. Messrs. W.W. Howard Bros. & Co., agents for the Government of India, have been at great pains to show the practical possibilities of several unfamiliar timbers. In particular, attention should be called to the parquet floor and staircase of silver-grey wood, which has a delicate grey colour and a satin-like lustre; and still more to the billiard-room, which is panelled in laurel wood. This wood is of a golden to greyish-brown colour, with deep streaks and markings of a dark umber shade, and it has a bright metallic sheen on the surface when planed and polished. It is undoubtedly a very beautiful wood, and suitable for the finest decorative work. As it can be obtained in large sizes it is admirably adapted for panelling. Another attractive timber which is seen here to great advantage is Andaman padauk. This varies in colour from pale cherry to crimson and vermilion, and is generally streaked with darker shades which sometimes become a deep black. The texture is fine and hard, and the wood is extremely strong and durable. A railway coach built at the Great Eastern Railways Company's works is on view. It contains first and third-class carriages decorated throughout in silver greywood and padauk respectively.

The exhibition should have important results for the home timber trade in making known the resources of the Empire, and it is to be hoped that it will lead to the development of new sources of supply, the extension of established ones, and the study of a world-wide range of timbers:

CANADIAN FORESTRY DEVELOPMENT.

The Report of the Director of Forestry (Department of the Interior, Canada) for the fiscal year ended 31st March, 1919, states that the policy of economy which has been followed during the war was continued during the year. All controllable expenditure was kept to the lowest proportions possible, and no new lines requiring large expenditure were opened up.

While the practice of economy continues necessary, it is pointed out that the expenditure of Canada on forestry, compared with the forest area, is the smallest in any progressive country of the world desirous of taking its place in the world markets as an important and permanent factor.

The position of Canada in the world as a forest country is a large and important one; in the British Empire it is even more important. The situation in Canada is complicated, however, by the fact that the forests are divided in ownership among a number of Governments which have independent jurisdiction, but it would seem that, in response to the call from the Imperial Government, some wider system of co-operation between the Federal and Provincial Governments might be worked out.

The necessity for well-organized research work in forestry becomes more and more manifest as the forests become more mature and timber operations develop.

The appropriation for the year under review was 650,000 dols. The field expenditure, exclusive of tree-planting on prairie farms, was divided as follows among the provinces:

	Dols.
Manitoba	88,295
Saskatchewan	132,709
Alberta	165,825
British Columbia (Railway Belt) ...	98,362
Total	485,193

TREE PLANTING.

The distribution of trees from the forest nursery stations at Indian Head and Sutherland, Saskatchewan, for planting on farms on the prairies, continues steadily from year to year. In the spring of 1918, 5,765,000 trees were distributed to 4,388 applicants. In the southern parts of Saskatchewan and Alberta the early part of the summer was very dry with considerable wind, so that the conditions for the establishment of plantations were far from good. Such a season, however, brought clearly before the farmers the advantages of proper preparation of the soil and of thorough cultivation thereof after the trees were set out. Although there were considerable losses in some plantations, in places where proper preparation and cultivation of the soil were thoroughly practised, they were small and almost negligible. Since the inauguration of the system of distribution of trees to prairie farmers, 49,849,271 trees have been distributed, and in all cases where reasonable care was taken and instructions followed, the plantations have been, and continue to be, successful. The number of trees ready for distribution in the spring of 1919 was 5,388,714.

The number of trees planted in the forest reserves was 196,350, mostly white spruce, jack pine, and Scotch pine.

TREE SEEDS FOR GREAT BRITAIN.

In response to requests from forestry authorities in the United Kingdom, tree seeds were collected in British Columbia by officers of the Forestry Branch. These were forwarded to the Forestry Commissioners for Great Britain to be used in the carrying out of re-forestation plans under way in the United Kingdom. The seeds included those of Douglas fir, Sitka spruce, Alpine fir, and of other species which the British authorities desire to test.

TIMBER OPERATIONS.

There was a considerable increase in the timber operations in the forest reserves during the year. The high cost of lumber and the high cost and scarcity of fuel resulted in many more people than usual resorting to the forests for their supplies. The number of permits issued for wood and timber was 4,142, and the quantities cut there under totalled 6,783,104 feet board measure; 1,065,934 lineal feet, and 43,557 cords. The number of free permits was 1,715. There were twelve mill-site locations on the forest reserves occupied for cutting lumber for settlers under their permits. Twenty-one timber sales were in operation during the year. The cut of saw-timber on such sales was 1,607,362 feet board measure; of mine props, 2,188,767 feet board measure, and 1,212,752 lineal feet; and of lagging, 1,455 cords and 400,000 lineal feet.

LOSSES FROM FIRE.

There were 116 fires on the forest reserves, as compared with 159 in the previous year. Eighty-one of these fires burned over more than ten acres each. The total area burned over was 109,735 acres, of which 3,529 acres were covered with merchantable timber, and 26,472 acres with young trees.

TRADE WITH MEXICO.

According to figures compiled by the Dominion Bureau of Statistics the value of imports into Canada from Mexico for the year ended 31st March, 1920, was 2,648,915 dols., as compared with 514,047 dols. for the year ended 31st March, 1919; 664,790 dols. for the year ended 31st March, 1918; and 677,551 dols. for the year ended 31st March, 1917.

The values of exports from Canada to Mexico during the same period were 410,825 dols., compared with 568,943 dols., 482,428 dols., and 70,330 dols. respectively.

IMPORTS OF PETROLEUM AND GUMS.

Well over half the value of imports for the year ended 31st March last was contributed by petroleum products, the import of which was valued at 1,560,611 dols., as compared with 9,051 dols. in the

preceding twelve months, nil in the year ended 31st March, 1918, and 14,927 dols. in the previous year. Gums and resins accounted for 610,757 dols. in the past year, comparing with 517,738 dols., 578,040 dols., and 528,632 dols. in the three preceding years.

Exports call for no special comment except that shipments of pipe and tubing were made in the past official year to the value of 86,827 dols., and of canned salmon to the value of 70,233 dols., these figures in both cases comparing with nil in the three preceding years.

AGRICULTURE IN BOMBAY.

The following summary of the progress in Agriculture in Bombay has been furnished by the Director of Information in Bombay:—

Agriculture is still by a very long way the leading industry of India, for it supports more than 80 per cent. of her people.

Some little time back there was a meeting of the Bombay Provincial Agricultural Board at Poona. Important agricultural problems were considered at this meeting, such as the results achieved by the Agricultural Department, the improvement and financing of cotton crops, the prevalence of infections diseases among cattle intensive cultivation of land, improvement in the supply of manure and the cheapening of Railway freights on the same. The proceedings, the papers submitted, and the discussion thereon have now been published by the Bombay Government in the form of a convenient and well produced Blue Book.

Mr. Keatinge, the Director of Agriculture, in his paper dealing with the technical results attained by his Department showed that careful testing and experimental work had evolved systems of good clean tillage, proper rotation of crops and adequate manuring, on the various Government farms and that the results of these operations are satisfactorily evidenced in the excellent crops obtained. The Department has experimented with a large number of new implements, and adopted those which proved most suitable to the needs and circumstances of the cultivators. The cultivators have taken up extensively the various patterns of ploughs which after extensive tests by the Department, were recommended, and to a less extent harrows seed drills, sowers, threshers, and levellers as well as the improved furnaces, puns and other apparatus necessary for making.

In the matter of artificial manures it has been shown that standard mixtures can be applied with great profit to sugar-cane, tobacco, onions, chillies,

plantains and potatoes. The Department farms have also introduced dry crop groundnuts of various kinds which are not only a valuable crop, but are excellent as a rotation for cotton or jowari. The agricultural engineer has located extensive sources of underground water in Upper Gujarat and parts of Thana District, sufficient to turn these areas into a garden.

During the discussion upon this paper, the Hon. Diwan Bahadur Godbole said that every effort should be made to apply the approved methods to the cultivators own fields when these had been adapted to their own resources. He instanced a case in Berar, where a farm which formerly produced only Rs. 7,000 worth of cotton was made to produce cotton worth Rs. 23,000. In reply Mr. Patil, one of the Deputy Directors of Agriculture, said that the Department were already demonstrating their improved methods in cultivators' own fields; and he instanced 40 cotton plots in Khandesh, 40 sugar-cane plots on the Deccan Canals and many others.

Dr. Harold Mann discussing the improvement of the supply of manures for intensive cultivation said:

"Last year the consumption of sulphate of ammonia in this Presidency amounted to only 600 tons, but if its price goes down a bit there will soon be a demand for 2,000 tons or more a year. He protested against the very high cost of railway freight and it was ultimately resolved to approach the Government to ask Railway Companies to charge minimum rates of freight on the carriage of manures.

In advocating a systematic fight against infectious diseases among cattle, Mr. Taylor of the Veterinary Department said that the loss in cattle due to these diseases amounts to nearly Rs. 50,00,000 in 5 years in the Presidency proper. During the discussion of Mr. Taylor's paper, several members including the Hon. Mr. Purshottamdas Thakordas and Mr. Keatings expressed regret regarding the slaughter of milch cows in Bombay, which are sold to butchers when they go dry. In this connection, it will be remembered that the Bombay Government accepted the Hon. Mr. Purshottamdas' resolution in the Bombay Legislative Council last September, regarding the prevention of slaughter of cattle in general and of milch cattle in particular.

The proceedings of the Bombay Provincial Board of Agriculture, as the volume is entitled, is issued at the price of annas 10 and may be obtained from the Government Book Depot, Poona. It is a publication which will be found of interest and value to all who are in any way concerned with Agriculture.

CO-OPERATION.

Bombay Report.

The problem of rural stagnation in India, attracted much attention towards the end of the last century. The Bombay Government were among the first to recognize its importance and as early as in 1883 they took steps to help on a scheme for the organization of an agricultural bank. As, however, the Secretary of State took exception to the scheme, and as Acts like the Deccan Agriculturists Relief Act (1879), Land Improvement Loans Act (1883) and Agriculturists' Loans Act (1884) were passed with the same object in view, the Bank scheme was allowed to drop.

The Madras Government deputed Sir Frederick Nicholson to Europe, to study the movement for organizing rural credit there. He summarised his conclusions in the words 'Find a Raiffisien,' by which he meant not only that rural credit societies such as those started by Raiffisien in Germany should be started, but also that genuine and devoted enthusiasts like Raiffisien were needed for the work. A few officers then started credit societies in some parts of India, but Lord Curzon, realising the importance of co-ordinated effort, appointed a committee under Sir Edward Law to suggest lines for the necessary legislation.

As a result of the deliberations of this Committee the Co-operative Credit Societies' Act was passed in 1904 and the officers then lost no time in setting to work. An idea of the progress made may be gathered from the fact that the number of Co-operative Societies in the Bombay Presidency, which was only 12 with a membership of 219 in 1904, rose steadily to about 2,400 during 1919-20; and this in spite of the war conditions, bad seasons and the banking crisis. The Co-operative Societies' Act was later on amended in 1912 and its scope widened.

Last year's report for Co-operative Societies in the Bombay Presidency contains two remarkable features. One is the classification of Societies into three groups or types as (a) Resource Societies, (b) Consumers' Societies (including Building Societies) and (c) Producers' Societies. This made easy the solution of the question as to which kind of Societies should be financed by the Provincial Co-operative Bank. The view was put forward by the Provincial Bank that while its first duties were to agricultural Co-operation, yet it can, under proper safeguards, finance all resource societies when required; but it

could not reasonably have any dealings with other groups and in particular with consumers' societies. This view was approved by the Government of Bombay. This convenient classification was suggested by the Registrar, who based it on investigations he had made in France.

The bulk of the Co-operative Societies are agricultural Credit Societies. In the year under report their number rose from 1,648 to 1,993, and their working capital from 81½ lakhs to nearly 108 lakhs. The growth of the reserve funds is perhaps the easiest test of the success of Agricultural Credit Societies and the funds have during the year grown from 5½ lakhs to 7½ lakhs.

Fully admitting the impressiveness of these facts, there are a certain number of thoughtful co-operators who have been inclined rather to doubt whether the provision of easy credit, unaccompanied by improved agricultural methods, has not actually done harm, by inducing a certain habit of extravagance, and a certain callousness to debt. All people concerned with the movement must, therefore, thoroughly grasp the principle that the provision of credit to cultivators is of real benefit *only if the credit is used to obtain increased production.*

The best, if not the only way to secure this increased production is by organizing non-credit societies to procure the cultivator the necessary resources in improved agricultural requisites. There were in the year under report only 102 non-credit agricultural societies, of which 26 were for the supply of manure, 19 for the supply of seed, and 13 for the supply of implements; 8 were dairy societies, 14 for cattle breeding, 4 for cattle insurance, and 18 for the sale of cotton and other agricultural produce. The condition of some of these Societies, such as the dairy societies and the cattle insurance societies, is very disappointing. Steps have, however, now been taken to establish a closer touch between the Co-operative Department and the Agricultural Department. It is moreover contemplated to employ agricultural graduates as organizers under the Assistant Registrars. The whole question is going to be further ventilated and discussed at the next Provincial Conference. A hopeful feature of the Agricultural Credit movement this year is its extension in Sind, in spite of great difficulties.

By far the largest number of non-agricultural Credit Societies exists in Bombay itself. It is to be regretted that the large towns of Poona and Ahmedabad have not followed this example to any extent worth mentioning. At present practically no banking facilities exist anywhere except in the Presidency City. It is hoped that the Urban Credit Societies will succeed in providing those facilities which are so badly needed. An important class of societies in

this group is that of the Weavers' Societies, weaving being the only cottage industry with regard to which the Co-operative Movement in this Presidency has made progress. These societies seem to have recovered from their previous year's bad condition much more rapidly than was anticipated.

There are now 16 Central Banks in the Presidency as compared with 12 during the last year. These banks are intermediaries between the primary agricultural societies of an area and the Provincial Bank; they are, therefore, expected to play the most important role in the control and finance of agricultural societies. The result of last year's work of the Bombay Central Co-operative Bank, which is really the Provincial Bank of this Presidency, were satisfactory, and as the finance of the whole movement depends ultimately upon the management of this bank, the thanks of all concerned are due to the Board and the Manager. Reviewing the Rosource Movement as a whole, it has been pointed out that its reserve fund amounted to 13'20 lakhs and the profits to 5'89 lakhs. The movement has done a great service to the country by bringing into circulation money which a few years ago would have been kept in hoards, and would have been lying unproductive.

With regard to the Consumers' Movement, the number of stores is still only twenty. But this branch has been taken in hand only recently, and from December last a special Assistant Registrar has been appointed to encourage the movement. A Wholesale Society has also been organized in Bombay.

The organization of Co-operative Building Societies has made very good progress this year, for which credit is due to the Bombay Co-operative Housing Association, and its energetic Secretary Rao Bahadur Talmaki. Fourteen new Societies were organized during the year. The movement is, however, faced by a very real difficulty in the present heavy cost of labour and building materials. These Societies also require expert guidance in Engineering and legal matters.

A special feature of the Co-operative movement in this Presidency is the help it has received from non-official workers in the organization of new Societies. The Central Co-operative Institute, which is a non-official body instituted for focussing all non-official Co-operative activities, did extremely useful work during the year by means of its Co-operative journals, training classes, lectures, etc. A Provincial Conference was held at Poona in September, and was opened by His Excellency the Governor. There were some ten small conferences organized by various local co-operators, at their own expense, the Department making a supplementary grant wherever necessary.

The Government of Bombay has consistently befriended and supported the Co-operative movement, as being the true key to rural reconstruction and progress in this Presidency. It has always welcomed warmly non-official effort, and now that the department is to pass into popular control, it is the more necessary that the public generally should realise the importance, and the great potentialities of the Co-operative movement in Bombay Presidency.

BOOKS IN BRIEF.

Life and Labour in the Nineteenth Century—By C. R. Fay, *Fellow and Lecturer of Christ's College, Cambridge. Published by the Cambridge University Press. Price 20sh. net.*

Mr. Fay is so well-known a writer in the field of co-operation and co-partnership that his present work requires but few words from us to commend it to the attention of our readers. It contains the substance of lectures delivered at Cambridge in 1919 to students of economics, among whom were officers of the Royal Navy and students from the army of the United States. The first part of the book deals with the international background 1815–1820, with the influence of Bentham, Robert Owen and Cobbett, and with the old poor Law and the new. The second part reviews the political background from 1830 to the present day and the industrial scene in 1842. Codenism, Chartism, Capitalism, Socialism and the Co-operative Movement are discussed and the last two chapters deal with the Remedies of the XIX Century and the growth of Co-operative Life. It is desirable to add that readers who are business men will do well to commence with Chapter XIV of the book (which is headed "The Industrial Scene, 1842"), and read through it to the end. There, as Mr. Fay points out, they will find what he considers to be—from an industrial standpoint—the heart of the matter. We have space only to refer to a few points mentioned in this carefully written book. In the Chapter (XX) on the "Revival of Socialism", Mr. Fay sets out the causes which have contributed to the extraordinary influence of Karl Marx on English working class thought. The last section of this chapter is devoted to a comparison of English and continental Socialism. Chapters (XXI) and (XXII) ought to prove a corrective to many who think that Government has not kept pace with ideas of social reform in England. Altogether, this is a valuable and interesting book. It is a book of the XIX Century England and ought to be welcome to all interested in modern industrial conditions, their origins and their history.

Free Trade, The Tariff and Reciprocity.—By F. W. Taussig, Ph.D., LL.B., Litt. D. *Henry Lee Professor of Economics in Harvard University and some time Chairman of the United States Tariff Commission. Published by the Macmillan Company, New York. Price \$2.00.*

The question of tariffs and reciprocity is no longer one of those for academic discussion in this country. It is one of practical politics. This book by perhaps, the greatest authority on tariffs in America, will therefore be welcomed by all interested in the subject. Tariffs have long been known in America but the War has given a new meaning to the whole basis of the argument supporting their imposition. Professor Taussig discusses the topic under various heads, some of which are the following:—The Present Position of the Doctrine of Free Trade; Abraham Lincoln on the Tariff: A Myth: How the Tariff affects wages; Wages and Prices in Relation to International Trade; How to Promote Foreign Trade; Reciprocity; Cost of production and the Tariff; How Tariffs should not be made; The Proposal for a Tariff Commission; and Tariff Problems after the War. As may be ex-

pected Professor Taussig discusses the various aspects of the Tariff problem in a masterly manner. His reputation for lucidity of expression already so high, will be greatly enhanced by this publication. We cannot think of an equally good book on Tariffs and would heartily commend Professor Taussig's as both informative and practical. We will allow ourselves the pleasure of quoting only one passage from his book. Writing in his final chapter on "Tariff Problems after the War" on the topic of "Essential articles" he observes:—"The sort of economic warfare and would-be strangulation implied in the quest for control of essential materials and 'key industries' is to my mind abhorrent. It is not to be thought of as part of a peace that shall really terminate the great War. But if it must be faced as among the possibilities of an inconclusive settlement; the United States is in a stronger position to let it go on than any other country."

Mercantile Credits and Collections.—By Charles A. Meyer—*Published by the Macmillan Company, New York. Price \$3.50.*

This is a thoroughly practical book by an experienced credit man, on mercantile credit and collections. There is so much that is good in it that we would heartily commend it to business men. The heading of one chapter—and we have read through the whole of it carefully—will show how eminently practical is Mr. Meyer's work. We have in mind when we write this, chapter VII of his volume which is entitled "Converting Doubtful Orders into Good Ones, and the use of guarantees." It solves for the practical business man the great question: How to get the cash by tact? The rest of the book is cast in the same mould. We should like to see the book widely used in this country, especially in the commercial and banking circles.

Common Commodities of Industries—Silver.—By B. White, F.R. St. S. and F.R. Econ. S.—*Published by Sir Isaac Pitman & Sons Ltd.—London. Price 3sh. net*

This little volume on "Silver" will be found to be both useful and comprehensive. It is a matter for congratulation that Mr. White has been able to crush into the space available for him such a mine of information about silver. Mining, marketing, industrial consumption, its utility as money, are among the topics dealt with by him in the book. The insets enhance the value of the volume. We have no doubt that it will attract the attention that its merit deserves.

ACKNOWLEDGMENTS.

A Comparative Study of the Educational Statistics of Denmark and Mysore. Issued by the Board of Education, Mysore Economic Conference.

Oxford Tracts on Economic Subjects. Nos. 1–7. Printed in England at the Oxford University Press, by Frederick Hall and Published by Humphrey Milford, Amen Corner, London, E. C. 4. Price 1½d. each.

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MYSORE UNIVERSITY CONVO- CATION.

BY SIR LESLIE MILLER, K.T., C.B.E.

[The following Address was delivered by Sir Leslie Creery Miller, Vice-Chancellor of the University of Mysore, at the Third Mysore Convocation :—Ed., M. E. J.]

YOUR HIGHNESS, LADIES AND GENTLEMEN.—At this the third Convocation since the birth of the University of Mysore I occupy a double position. I am as Vice-Chancellor expected, I understand, to tell you something about the doings of the University in the past year, and I am also a co-member of the Senate or other person nominated by the Chancellor to deliver an address suitable to the occasion. Combining these two capacities, I combine also the two discourses and thereby hope to save for you some of your doubtless very valuable time and to reduce to some extent the strain upon your attention.

I shall not attempt to emulate the moving eloquence of either of my predecessors in this position, nor can I pretend to offer you anything that is new. I shall endeavour to be severely practical, and I shall indent on my predecessors for my texts. I shall by no means expatiate free over all the range of educational ideals, projects and problems, a mighty maze of which I cannot pretend to have devised or even to possess a plan. I

should have liked, had time permitted, to have made an attempt with the help of the charts supplied by my two predecessors, to measure to some extent the progress we have made in the short time that has elapsed since we put to sea. But as it is, two points and two only do I propose to emphasise: one I shall put before the people of Mysore and the other I shall on behalf of that people, present to my young friends the new graduates of the Mysore University. But of these a little later.

In the latter part of the past academical year the shadow of mourning has darkened the University. The death of the First Vice-Chancellor has deprived her of a very faithful friend—who sat by her cradle, a zealous, loving nurse; and helped to guide her infant footsteps on her appointed path—a genial, kindly gentleman. In the deliberations of the Council we greatly miss his gentle guidance, and his complete knowledge of the details of all the subjects that came before us.

He has bequeathed to the University two tokens of his good will: a prize to be competed for by men and a prize to be competed for by women, tokens which amid many other things will serve to keep his memory green when all of us who knew him and who mourn his loss, shall have followed him.

Another zealous friend Mr. Thomas Denham has left us but happily still lives to watch with interest and sympathy our efforts and our successes; and doubtless to lend us,

if need be, a helping hand from time to time.

I have not much to say about the year's events. Our students have increased in number by some 100 men and in the present year which commenced on the 1st of last July we have been faced with the problem of finding place for more candidates than we can easily accommodate. When our young men are urged to turn to the study of science and technical knowledge, it is incumbent upon us to provide for those who accept the invitation: and how to do this, is one of the questions which require solution early.

But if young men are clamouring at our doors that is not the case with young women. For them we are still waiting. It may be that we are at fault: that we do not provide sufficiently varied 'attractions' if I may so phrase it: that we ought to increase the number of the courses of study: that is obviously a matter mainly of expense. The problem from this point of view is to provide the necessary attractions at the minimum cost. It is not insoluble, I dare say, but I am not attempting to propound the best solution for one thing because it is clear to me that even with the restricted curriculum at present available to students of the Maharani's College, there ought to be in that College a far greater number of students than at present there are—I do not seek to fix the blame for that, but I am sure the University cannot be held to be mainly, if at all, in fault.

Our endowments are steadily, if slowly, increasing: in the past year some Rs. 4,500 have been added to the total, and since then two other gifts have been offered, one of Rs. 1,000 by a gentleman of Saklespur for a medal, and one of Rs. 5,000 by Mr. P. Raghavendra Rao also for medals in memory of his father Mr. P. Krishna Rao. These await only formal acceptance and final settlement of the conditions of award. For all these contributions the University cannot be to grateful.

I believe I am fully justified in saying that throughout the year the Government, the Senate and the Council have done all that seemed to them possible to help the University on the path of progress on which it has so recently started; but over all this endeavour has hung the cloud of poverty. "Postponed for lack of funds" has seemed to me, since I was asked to do the duty of Vice-Chancellor, to be the fate of all or nearly all the schemes suggested for expansion and development. Bid me not revive the *infandum dolorem* of those disappointed efforts of ours. Are they not written in the records of our Senate and Council meetings and the proceedings of the Government in the department of education and agriculture? There let them lie till times are more propitious. A kindly pat on the back by Sir Michael Sadler and some of his learned colleagues have assured us that our start has been good, that our constitution is framed on the approved lines; and my successor and the Council has now to consider with the help of an analysis, full of suggestion made for them by Mr. Denham, the report of Sir Michael Sadler's Commission so far as it presents features, ideas, methods which may be found suitable for adoption here. It is probable, nay certain, that some changes may be found desirable and naturally we shall be found to have made some miscalculations. I do not myself believe that any change which the new Vice-Chancellor and the Council will be able to suggest will render the administration less expensive, and it follows that so long as 'financial stringency' is with us we shall be hard put to it to do any of the many things which even now seem to us desirable.

The process of cutting our coat according to our cloth is simple enough and satisfactory enough if the material is plentiful; it becomes a difficult and somewhat disheartening task when the supplies of the cloth are insufficient to meet our demands: our aim is to turn out a really useful, comfortable and reasonably fashionable garment with all the

newest improvements and adornments; and I do not doubt that even with the material now at our disposal we shall, given plenty of time, achieve a very creditable result, but if we are to be delayed till the period of financial stringency shall have waxed and disappeared, our progress is likely to be very much slower than we or most of our well-wishers desire.

On the one hand we have eager insistent voices, anxious and rightly anxious to provide for the youth of Mysore of both sexes, the opportunity of studying in their own University all the branches of knowledge which they desire to acquire: one urging us to furnish our coat with an agricultural swallow tail, another insisting on a medical cape, others suggesting full legal pockets or a musical and artistic collar and cuffs, and beside all these, we have still in our ears the voice of Sir Ashutosh Mookerjee bidding us "Forget not that education is the one subject for which no people has ever yet paid too much."

On the other hand we have the Government holding in trust for the people the monies gathered mainly from the people, bidding us be patient, handing out to us such quantity of material as they believe they can rightly spare for us, and bidding us make the best of it. "We know," they will tell us, "that education is the most important, as it is also the most importunate, of the departments over which our funds are to be distributed, and we may accept Sir Ashutosh Mookerjee's statement that if the history of civilization be explored it will be found that "The people who provided the greatest educational opportunities were always the most wealthy, the most powerful, the most respected, the most secure, in the enjoyment of every right of person and property."—We observe, however, that he speaks of 'peoples' not of 'Governments' and we should like some of those who have accepted his invitation to explore the history of civilization to inform us whether the proportion of the revenues expended on the provisional of educational

facilities by the Governments of those 'peoples' was greater than the proportion spent by us to-day. "We recognise," they may say, "That if ever the time comes when our weapons can be cast away or beaten into plough shares and pruning hooks that time will come through the spreading of knowledge, and we recognize that in the spreading of knowledge the University is one of the most important and effective agents which we can employ, but the time is not yet, when our policemen can be beaten into school-masters, our magistrates and judges turned into professors, our courts and our jails 'scrapped' or converted into libraries and lecture halls. For the present, you must be content to take your share of the revenues and that share shall be as great as we can make it with due regard to the requirements of our other necessary if less important services." That is reasonable enough, right enough. But the result is that the University fails to obtain the necessary subsistence. So far from being able to expand, so far from being able to inaugurate more courses of study in new branches of learning, or higher courses of study in those already taught, we find ourselves unable solely from lack of money to do all that ought to be done to provide for the courses which already are set out in our Calendar. I have already referred to one or two facts, which show how we are situated. Our students have increased in number by about 100, and in July last for 40 seats in the Engineering College there were 180 candidates—some from outside the State of Mysore—and it was, I think in the month of July last that one of my colleagues and I leaving the court at about half-past two in the afternoon to enjoy a brief half hour of doubtless well-earned rest were to our surprise escorted through the corridors by a numerous band of young men, obviously students. It was not the pattern of our gowns they came out for the study: it was not the silvery gleam of the maces borne before us that attracted their cupidity; they were simply a

number of honest lads who had qualified themselves for admission to the University and were come to ask the Vice-Chancellor to help them to obtain seats in the Central College—where there was no room for them. What help was possible had in fact already been given by others. The Principal of the College had already made the best possible arrangements for the applicants and the Government readily sanctioned the necessary expenditure. So far so good, but these things are a warning. If we are likely to find increasing difficulty in providing for the accommodation of would-be University students what becomes of the proposition, put forward two years ago as axiomatic. "All sources of knowledge must be open to all students as they want them"? If the people of Mysore intend to accept this proposition, if they mean to make their University self-contained, if they desire that the young men and women of this country shall be independent of its recognition, by other universities, for their higher and more specialised post-graduate studies—then they must recognise that there is only one key which can effectually lay open the sources of knowledge and that key is a key of gold; and they must make up their minds to help in the making of that key. For it has to be remembered that every student entering our halls is a source of expense no less than of pride to us. We cannot increase the number or the strength of our classes without increasing the staff of our teachers; it may be that a pleasant path in a shady grove may suffice as a lecture hall for the inspired exponents of philosophical systems; a platform under a pipal tree may do for the students of history; but for those who seek to study science under modern conditions, there is more to be done; delicate and costly apparatus, specially designed and constructed lecture rooms and laboratories, all have to be provided in sufficient quantity, and none can be provided without a large expenditure. What then are the people of Mysore going to do about it? I turn to the

report of the address given at the Convocation of last year by my friend and sometime colleague, Sir Abdur Rahim. What does he say about it? "I have not the least doubt that the citizens of this State are proud to have a University of their own. May I not also assume that every one will consider it to be his duty to make such contribution as he is capable of, towards its advancement? The rich men of Mysore.....will, I earnestly hope, rejoice in having an object, worthier than which there is none, on which to lavish their wealth and treasures. It would be a matter of surprise and disappointment to all if the Mysore University is not richly and abundantly endowed by the munificence of the wealthy sons of the State.

I am afraid our friend, if he has been watching us with the sympathy indicated in his address, must by this time be somewhat surprised and somewhat disappointed. Not that we are ungrateful for the gifts that have been made to us; far from it, but they, so far, are gifts for the provision of rewards to students, very valuable to the University, but not quite what Sir Abdur Rahim meant, I think, by endowment. It may be, I think it is, likely, that we somewhat overestimated the number and perhaps the resources of the wealthy sons of the State. There are probably few whose wealth could enable them to make large contributions to the University: contributions such as the recent gift of £165,000, (say 16 lakhs of rupees) for a school of Biochemistry at the University of Cambridge, may make our mouths water but we do not at present expect a superabundant supply of them from individual citizens of Mysore.

But if the citizens of Mysore are really proud of having a University of their own, if they really desire and really mean to establish it firmly on solid foundations with the least possible delay, can they not call in aid of their determination that spirit of co-operation of which so much is heard in these days?

What one man cannot do by individual effort, many may accomplish by united endeavour.

Surely it is not necessary to label each gift with the name and style and address of some individual donor. Can our citizens not sink their individuality in their corporate capacity? Is it not possible for a number of citizens representing some locality, or less desirably, some community, to combine in contributing an endowment? Can we not hope to see, let me say, a Senate House presented by the citizens of the Mysore City or of Mysore District? Why should we not have a chair of what you will, be it Biology, or Geology, or History, or Philosophy, or Sanskrit, founded and endowed by the citizens of Shimoga? A Tumkur professor of this, a Kolar professor of that, a Chitaldrug professor of the other? Let but our Cities, Districts, Taluks, Hoblis, and what not vie with one another in bringing gifts for the maintenance and expansion of the young University, which if all be true that is said, they were so eager to establish, and soon we shall feel that we stand firmly on our feet and may venture to increase the length of our stride. Our University is now, as all of you know, not a State-aided but a State maintained institution: it is I venture to think too much dependent on the fluctuations of the public revenues and the requirements of other schemes and projects from year to year. I do not for a moment doubt the good will of the Government. I do not for a moment question its generosity, I do not hope or indeed wish to free the University entirely from Government control or to make it entirely self-supporting without aid from the State. I believe that it is now well established, and I give no heed to the critics who even now from time to time suggest that it is still a costly experiment, liable to be 'scrapped' if I may so express it, at short notice: I believe that it will grow and is growing in strength and in health, that it will abundantly repay the State and people of Mysore the labour and the sacrifices they

have made to establish and to nourish it, but I believe that it will grow and ripen the better for a greater financial stability, greater financial scope for development, and I see in the gifts of the people the most promising and the best method of hastening the day of harvest. The method at present most in vogue with the citizens that of belabouring the shoulders of authority with the bludgeon of importunity is a method which has its uses and achieves results, but it requires in my view to be supplemented, if not supplanted, by the method I have suggested, whereby the people themselves put the hand of assistance to the plough of endeavour. Thus will they manifest their real interest in their University and go far to ensure the increase in the future of the prosperity and happiness of their country.

If I have wearied you with so long and so 'materialistic' a discourse, it is because I have felt that this is the best opportunity I am likely to get of emphasising a matter of very great importance to the future of the University: and because it seems to me necessary to keep in view the materialistic side of our educational problem, for it is perhaps likely to be a little eclipsed, and obscured by other more attractive aspects of it.

Now, I turn to the matter which is the proper subject of the discourse suitable to the occasion which it is my duty to deliver, a word or two to you who have to-day received degress in this hall and I ask you what are you going to do for Mysore—what are you going to do to repay your country and your families for the sacrifices made for you, for the education already given to you and for the education which will, I hope, be given to many of you hereafter, in this University or elsewhere. If the question occurs to you what is the profession in which a young man with a university degree can best serve Mysore at present, I believe that if you give yourselves an honest and sincere answer, that answer will be 'the profession of a

teacher'. Everywhere we hear of the need of education—a few days ago at the opening of the Assembly, I heard the representative of an association of members of what are known as the “depressed” classes deliver a short and interesting address to the Dewan. “What my peoples want of the Government”, said he, “is education”; and there are few, if any, communities in Mysore of whom the same thing cannot be said. Well, if that is the universal want, are you going to help to supply it?

The University will open next year a post graduate course for a degree in Teaching, and the Government is even now, I believe, considering a comprehensive memorandum on education and may soon enunciate a suitable and I trust a liberal policy. What that policy may be, I do not know, but I can hardly imagine any enlightened modern policy of education which does not involve the creation or extension of that, “Net-work of well-organized schools” of which Sir Ashutosh Mookerjee spoke two years ago—and each school of that net-work of well-organized schools requires a staff of skilled, trained and competent teachers. So, I venture to think, you will not have any lack of opportunities of obtaining employment as teachers, and there is, I believe, we have agreed, no occupation which affords greater opportunities of doing great and noble work for Mysore. But you will naturally ask how far the adoption of the teaching profession is likely to yield you sufficient fruit. The work may be great, the work may be noble, it will certainly be taxing. Will my reward be as great? Will my prospects be as noble? May I expect adequate compensation for my toil?

Well, for some years now it has, I think, been recognized that the occupation of a teacher is economically productive like that of the engineer and unlike those of the lawyer and the soldier, which in their essence are but necessary evils originating in the unwisdom of the human race—and we have heard from all parts of the world voices, powerful,

eminent, wise, voices, insisting on the necessity of attracting to the service of education by the offer of adequate rewards, the best equipped minds and brains, not to say hearts, to be found among the young men and women of the country, if that country is to keep pace with others in prosperity and general well-being.

I do not doubt that the Government of Mysore accept the soundness of the proposition so insistently urged, and it seems to me probable that in a few years' time the educational services of the State will present as many attractions to its members as any branch of the administration, and at least equal opportunities for rising to the highest positions and that not only in their own profession but also in the councils of the State.

But if you think that this prophetic outline is possibly painted in colours somewhat over-bright, then will you consider one other aspect of this matter? Do not we hear all round us the hymns of praise raised to the spirit of service, the spirit of sacrifice? Writers and teachers, lecturers and preachers, join without ceasing in exhorting and adjuring us to turn from our old faiths, to leave the multitude who throng the altars of the spirit of self-help, and join the small band of men and women who through the ages have paid their vows and brought their offerings to the altar of the spirit of service: the few who have been worshippers of that spirit not only with their lips but in their lives. “Trust no more” they tell us, “To the old dogma ‘God helps those who help themselves’—dogma born of the age-long cruel struggle for life. ‘God helps those who help others’ is nearer to the truth. Be not ever busy about your own needs whether material or spiritual. Be not over anxious about your own wealth, your own ambitions, your own comforts, your own souls: seek ye first the service of others, and all these things shall be added unto you,” Surely a grand doctrine, if a hard one.

In all this, of course, there is nothing new; for ages the doctrine of sacrifice has been preached by teachers of different religious and philosophical systems, preached it is true, but practised by few of the preachers and few indeed of their bearers. The struggle for life has held the field for long. Is the time coming when it is beginning to yield? Many will tell you "Yes. The spirit of service is moving the peoples of to-day and will spread its influence surely if slowly till the world is filled with its blessings." I hope that may be so, but the point now is this: if you are at all imbued or even slightly tinged with this spirit of service it should not surely be a very hard thing to live up to it, so to speak, to the extent which I am now suggesting. Even if by the adoption of teaching as a profession you cannot hope to attain as great wealth, as great worldly position, as great fame, as can be reached in other professions, other occupations, still you will not starve, your families will not lack food, clothing or shelter, you will not have to beg your bread; can you give up some hope of greater worldly advancement for yourselves, to bring to the service of your fellow countrymen those talents which you have been able, with their aid, to develop? Can you live for the good that you can do rather than for the goods that you can get? It is no small thing to bring light to them that sit in darkness. There are many ways of doing it, no doubt, and I have suggested to you but one and perhaps a very obvious one. It is at your choice. If you can see a better way take it, if not, give mine, I pray you your earnest consideration. Your University will watch your choice with sympathy and interest and whatever that choice be, I trust that in the fulness of time it will bring to you your hearts' desire.

ECONOMIC PROGRESS IN BARODA

BY A. P. SMITH.

IN January of 1918, an influential Committee of five members was appointed by H. H. the Gaekwar of Baroda for an exhaustive economic survey of the State, and to report on the progress made during the last thirty years, the resources available and suggestions for the development of those resources; and to discuss questions of principle and policy there anent. Suggestions from the public were invited and the result is a report of about 300 pages concerning every department of economic importance.

The opinions expressed by the Committee have been based on a careful enquiry and examination of existing conditions and of the suggestions put forward by Heads of Departments immediately concerned with the economic development of the State.

After a brief note on the physical features of the State and its administrative units, vital statistics, land tenure, growth of industries since 1905, land revenue, wages, etc., in Part. I.—Part II. deals with the steps taken by the State during the last thirty years to develop its economic resources. There is much information in Part I which deserves mention, and a fact of ominous significance is that the controlling factor in the life and subsistence of the people of the State are the periodic rains. If these are seasonal and abundant, the people prosper, but even one years' failure of the monsoon, either in time, or quantity spells practical bankruptcy of the great majority of persons primarily dependent upon agriculture; and such failure involves loss of property and even death. In the words of Abernethy Mackay "Famine is the horizon of the Indian Villager; insufficient food is the foreground" and what it is in all parts of British India, it is also in Baroda. There is no lack of cultivable soil and irrigation by channel and wells are not wanting; and

it is something that a few rivers and streams flow throughout the year.

A regrettable fact that does not apply to Baroda alone, is that by the decay and disappearance of the indigenous industries of the State, the people supported by them seek subsistence in agriculture. In ten years, for instance, the fall in industrial occupation is remarkable. In 1901,—and the decay of indigenous arts and crafts had begun many years previously—where 17.9 per cent of persons were engaged in industries of sorts, in 1911 the percentage was 12.30! To make matters worse those who turn to agriculture to obtain a living as a last resort are failures as agriculturists.

One of the obstacles to united effort in any direction is that in a population of about 2 millions in the State there are about 550 castes and sub-castes; not including mahomedans and the depressed classes. Three other cardinal facts are that the average income per head of population is a trifle less than 4 per mensem; that the death rate is high and that, though the birth rate is still high, the average duration of life is very low owing to feeble vitality resulting chiefly from malnutrition. Lastly, although the State has made considerable progress in education, illiteracy characterizes the vast majority of the population. An economic resuscitation, in these circumstances, must necessarily be slow. There is no necessity to review the steps taken by the State during the last thirty years to develop its economic resources. Are they not chronicled in the administrative, Census, Commerce and Industry reports? What is the nature of the recommendations of the committee is a question that is more vital.

In this regard education takes a most prominent place, and the recommendation is that education should be in two branches—rural and urban, and chiefly vocational, while teachers should be specially trained for the purpose. Instruction by illustrated pictures and the library department is also recommended and co-operation and co-ordination between the Commissioner of Education, the Curator of State libraries, the Registrar of Co-operative Societies, the Directors of Agriculture and of Commerce and Industries and the Sanitary

Commissioner is essential for drawing up a programme of work. The Committee lay stress on the necessity of spreading the knowledge of hygiene. Another recommendation refers to the relief of congested areas and habitations, and the selection of sites for extending villages. Under Agriculture, the Committee's recommendations deal with every aspect of the occupation that employs about 80 per cent of the population of the State, including Agricultural indebtedness, Co-operation, Land Rights, the training of local leading men in civics, agricultural problems, the diminution of drink, as a preliminary to its entire abolition, cottage industries, tenancy legislation and so on. A Forest policy practically similar to that pursued in British India is advised. As regards industries, the measures recommended are all worthy of attention and this *Journal* has already recorded work that has been done by the Commerce and Industries Department. Finally, the Committee make several valuable suggestions to afford the people engaged in Agriculture and Industries financial facilities. Of the making of books there is no end and much study is a weariness to the flesh and the Baroda Economic Development Committee has achieved a success in the formidable task entrusted to them for investigation. It is probable that their exhaustive of the problems has been wearisome, on saying which no reflection is meant in their earnestness or enthusiasm—and it only rests with His Highness's Government to give practical effect to the Committee's advice. Energy, enterprise and Government initiative are necessary to stimulate and encourage the people to awake from the lethargy in which they are stagnating and to become mobile in endeavour. "Reams of hiccoughing platitudes lodged in the pigeon holes of the Home office by all the gentlemen clerks and gentlemen farmers of the world cannot mind"—the conditions of the Indian villager, wrote Abernethy Mackay over 40 years ago. The words quoted apply *mutatis mutandis* to Baroda and other Indian States and despite Reports of sorts and statistics and recommendations, written annually or oftener, unless there is, besides good intention, sustained effort, unsleeping vigilance and fostering care, progress in economic development with an extremely conservative—apart from the other disabilities which have been noted—people must of necessity be impossible.

THE MINIMUM OF SUBSISTENCE, MADRAS CITY.*

BY THE REV. D. G. M. LEITH, B.A.,
MADRAS.

IN these days of difficult economic questions, it seems to me imperative that we should endeavour to fix the minimum of subsistence for the worker in the City of Madras. We are not in this discussion endeavouring to arrange for comfort or luxury. We are not trying to discover what a man needs to be comfortable (a task also important). We are not asking what he requires for the development of his intellectual and emotional and artistic life and for his children. Our task is much humbler. What is the barest minimum required in this City to maintain a man in physical efficiency so that from purely physical point of view he may discharge his duty to the community without that starved furtive look we so often see in the eyes of the Madras labourer to-day. Unless we know this, it is impossible for us to be just in fixing wages. Unless we know this we cannot form an intelligent opinion concerning the labour strikes and lockouts that are much an unhealthy feature of the life of Madras. What is the wage that will provide physical maintenance for a man and his family consisting of a wife and two children?

The task, of course, is no new one. It has been attempted by social and economic students in the West and various books have been published giving the results of the study. Perhaps the best known are those of Mr. Rowntree, his most recent book being "The Human Needs of Labour."

In Madras too a certain amount has been attempted. The Salaries Committee appointed by Government has endeavoured to estimate the daily essential expenditure on food.

*Paper read before the Madras Economic Association.

In 1917 a group of men chiefly young graduates, met at the Kellett Institute, Triplicane, under the guidance of Dr. Gilbert Slater. The aim of the group was to work out a standard by which to judge whether any given family income was sufficient for the physical efficiency of that family, in other words to discover a Living Wage.

The group took the diet prescribed in jail for an adult male prisoner doing hard labour as a basis and found that the cost of food per day for such a person in Madras was two annas 9 pies, making for a month of 30 days—Rs. 5-2-6. It was, therefore, reckoned that Rs. 5 might be regarded as a reasonable allowance for food for a man doing manual labour. Other investigations produced the following results:—

	Rs.	a.	p.
For man for food for month	...	5	0 0
For Wife " "	...	4	0 0
For two children " "	...	5	0 0

(N. B.—This was regarded as an average family)

Rent	...	...	...	1	0	0
Clothing	...	...	...	0	8	0
Fuel	...	...	...	1	0	0
Miscellaneous	...	...	...	0	8	0

Rs. ... 17 0 0

These results were published in the Press and evoked considerable interest and some criticism. But we felt that the criticism did not to any material extent destroy the general correctness of the minimum of subsistence which we had reached.

Conditions have since then tremendously changed. The whole economic position has altered. What is the new standard of minimum subsistence that must now be adopted? Can a new living wage be discovered? We felt we must try.

As in 1917 in determining the amount of food required by a man we have taken the jail diet as standard for the simple reason that that diet has been worked out by medical men on scientific principles as what a man

requires for physical efficiency when doing hard work. There is the further empirical reason that in point of fact we find that men who live on jail diet are physically strong. I know there are sentimental reasons against it and people argue that a man outside the jail should receive more food than the man inside. But obviously if the man inside the jail has diet which is scientifically correct there is nothing to be gained by a man over-feeding himself merely because he is free from restraint. In taking the jail diet we are able to stand on the rock of scientific accuracy.

Therefore we bought in the bazaar the commodities as suggested in the jail diet as follows:—

1. Ragi Price— $4\frac{1}{2}$ measures per Re. 1/-; but one measure cost $\frac{1}{4}$ /. We found that one measure was equal to 3 lbs. $\frac{1}{8}$ oz. that $48\frac{1}{8}$ oz. costs $\frac{1}{4}$ /. . . 15 oz. costs 1 anna 3 pies. Price in 1917, 1 anna.

2. Rice—boiled rice cost was $3\frac{1}{8}$ measure per Re. 1/—in the Triplicane bazaar, i.e., As. 5, pies 4 per measure.

One measure equals 3 lbs 5 $\frac{3}{8}$ oz. . . 5 oz. (the jail allowance) costs 6 pies as compared with $4\frac{1}{2}$ pies in 1917. I think it is fair to say that as far as I can discover few labourers are willing to buy rice at 3 $\frac{1}{8}$ measures: they seem to purchase a dearer quality but the cheaper is there and was purchased in the bazaar by Mr. T. J. Kumara-swami who has spent a great deal of time and thought on these investigations and without whose help this paper could hardly have been written.

3. Dholl— $2\frac{3}{4}$ measures can be purchased for Re. 1/—but 1 measure costs As. 6 $\frac{1}{4}$ measure, the amount we purchased cost $1\frac{1}{2}$ annas, and in weight $12\frac{1}{4}$ oz. 5 oz. the amount required in the jail diet therefore costs $7\frac{1}{3}$ pies.

4. Next come vegetables. These are obviously difficult to calculate as there is such variety. 6 oz. are prescribed in the

jail diet 6 pies can purchase that amount of vegetable according to various investigations. That can therefore stand—though personally I should be inclined to place it 2 pies higher.

5. Oil.—We purchased and weighed $2\frac{7}{8}$ oz. costing 1 anna 3 pies. So that $\frac{1}{2}$ oz. costs $2\frac{1}{2}\frac{4}{8}$ pies say $2\frac{2}{3}$ pies.

6. Tamarind was bought at $\frac{3}{4}$ oz. for 1 pie. $\frac{1}{2}$ oz. the amount in the jail diet costs $\frac{2}{3}$ pies.

7. Salt can be obtained at $1\frac{1}{2}$ annas per measure. $\frac{3}{4}$ oz. costs $\frac{1}{6}$ pie.

8. Curry powder $\frac{1}{4}$ oz. works out at 2 pies and onions at $\frac{1}{2}$ oz. equal to $\frac{1}{2}$ pie.

The food per day may thus be summarised:—

			As.	Ps.
Ragi	...	...	1	3
Rice	...	...		6
Dholl	...	...		7 $\frac{1}{3}$
Vegetables	...	...		6
Oil	...	...		2 $\frac{2}{3}$
Tamarind	...	...		$\frac{2}{3}$
Salt	...	...		$\frac{1}{6}$
Curry powder	...	...		2
Onions	...	...		$\frac{1}{2}$
			3	4 $\frac{1}{3}$

The daily cost is therefore As. 3-4- $\frac{1}{3}$.

For a month of 30 days the cost will be Rs. 6-4-10. With this we may compare the Report of the Salaries Committee which suggests 3 annas 5 pies for food per day inclusive I think of fuel.

But there are other items of expenditure. There is house rent. Broadly speaking there are two ways of living for a labourer in Madras. He may have a hut in a parchery or hutting ground or he may rent a room as a sub-tenant in a brick and tile house. In the former case there are different methods pursued. Certain rickshaw-wallahs, for example, hire a rickshaw from an owner. He provides them with a rickshaw and a hut. For the former the rickshaw-wallah pays a rent of As. 5 and for the hut 9 pies per day, i.e., Re. 1-6-6 per month. Others again pay

a ground rent for the hut of As. 12 per month and have to erect their own hut which may cost about Rs. 30. If for this he has to borrow, he will probably have to spend from As. 14 to Re. 1-8 in interest. To secure a hut in Madras to-day costs therefore from Rs. 1-8 to Rs. 2-4 per month. There are, of course, some who maintain that the hut is insanitary and unfit for human habitation, and that in the monsoon season it is always wet and nasty. There is something in the contention. On the other hand this alternative has to be compared with the other possibility, namely, renting a room usually dark as a sub-tenant in another house, for which at the lowest one must pay Rs. 3. The minimum one can put for rent is Rs. 1-8. I think it would be fairer to put the higher figure Rs. 3. It is true some pay less even than Re. 1. They huddle in stables; they crowd into a hut already inhabited by a family, perhaps relatives, perhaps not. In the dry weather, that is not perhaps so great a hardship. They can sleep outside. In the wet weather when they must all sleep in the same hut perhaps 7 ft. by 7 ft. well, it is bestial. The Municipality, I understand, prescribes 112 feet as the minimum superficial area for such a family as we have taken as our unit. I regard the space as altogether too small.

Next we deal with clothing. The minimum required for a man is a loin cloth and a head cloth for use by day and as a covering by night. These cost at present Re. 1-2 each and the man is said to require two pairs of these per year *i.e.*, Rs. 4-8 per year.

His wife also requires two cloths per year. These cloths are $7\frac{1}{2}$ yards long. A plain white cloth can still be bought at Rs. 3-12 but obviously a woman who is herself working as a labourer can hardly use a white cloth, and a coloured one costs Rs. 5-2, *i.e.*, Rs. 10-4 per year. We are assuming a family of two children, two cloths (one for each) for these as As. 10 each cost Re. 1-4. The total cost of clothing per year is there-

fore Rs. 4-8 plus Rs. 10-4 plus Rs. 1-4 or Rs. 16 per year, *i.e.*, Re. 1-4 per month.

Fuel is not easy to estimate. But one gundu of firewood costs As. 8. To boil one measure of rice $\frac{1}{6}$ th of a gundu is the minimum required. We can put fuel therefore at less than 9 pies per day or Re. 1-6-6 per month.

For miscellaneous expenditure we must allow something. Is the labourer never to chew betel, never to go by train, never to visit the barber, never to find vegetables a little dearer than is estimated, never to find that there are 31 days in a month instead of the 30 days we have estimated, never to have light in his house at night? Shall it be As. 12 per month? It cannot be less.

To sum up.—

		Rs.	a.	p.
Food for man	...	6	4	10
Food for wife ($\frac{4}{5}$ ths as in 1917)	...	5	0	8
Food for 2 children	...	6	4	10
Rent (I would like Rs. 3)	...	1	8	0
Clothing	...	1	4	0
Fuel	...	1	6	6
Miscellaneous	...	0	12	0
Total	...	22	8	10

or Rs. 24-0-0.

I lean to Rs. 24 per month as being the minimum of subsistence for such a family. But the wife of the labourer is often an earning member of the family. She may do casual cooly labour. She may make and sell appams. She may be a grass-cutter or a sweeper or a tiffin carrier. His earnings are very various. In 1917 we reestimated them at Rs. 4. I doubt if we should be justified in estimating higher than Rs. 4-8. I know grass-cutters who are only getting Rs. 3. There is a woman employed in my house on Rs. 3-8, a house being provided for her. I suggest we are justified in budgeting for the women's earnings inasmuch as there is not sufficient household labour to occupy her whole day and it is probably better for her to be employed provided the work is not too hard. This means that the minimum of

subsistence for the family is Rs. 19-8 for the man, and Rs. 4-8 for his wife. I admit, however, that under ideal conditions the husband should earn sufficient for all and anything earned by the wife would be utilized for securing special comforts for the present or for old age.

There is another point on which I am not satisfied—the number of children for which we have reckoned. We have taken the average number as two. I believe in Madras it is larger though I have not been able to secure figures to justify my belief. This is a point on which we require further investigation.

Again be it remembered, there is practically no comfort and little opportunity for self-improvement in such a life as this amount of money provides. There is no opportunity for a holiday. There is nothing to spend on the education of the children. There is no provision for saving for old age. There is nothing for charity. There is nothing for sickness, marriages, funerals and births. How are the expenses of these things met? There is only one source—Diminish the quantity of food. As a man said to me—"Sometimes we cook and sometime we do not." If there is additional expenditure on any of these heads, food is diminished and you have ill-nourished bodies and uneconomic men. We know too that much of the labourer's income goes to the toddy shops. The result is the same lack of sufficient nourishment, and when an epidemic comes, down fall men and women and children like ninepins.

I am interested in this question as a practical living issue. But this is not the time and place to apply the moral. If these calculations are reliable, it means that we have no right to employ a married man unless we give him such a living wage as we have reached and we must endeavour to bring influence to bear upon all employers of labour to adopt the same principle and secure the same end.

We must bring to a conclusion the semi-starvation of the worker.

THE ECONOMICS OF THE PEACE— A REVIEW.

By "I. C. S."

NO book published since the end of the war has been more discussed than Mr. Keynes' book on "The Economic Consequences of the Peace" (*Macmillan*. 8s. 6d. net). We owe Mr. Keynes an apology for so belated a review of it but the delay is not altogether to his disadvantage. The events of the last few months have done so much to establish the justice of his main conclusions that we can assure our readers that the book is even more deserving of study now than when it issued at the beginning of this year.

Mr. Keynes commences by showing that before the war Germany was the cogwheel of the European economic machine. "Round Germany as a central support the rest of European economic system grouped itself and on the prosperity and enterprise of Germany, the prosperity of the rest of the Continent mainly depended". The war wrecked European economic machinery almost as completely as Germany did, in a literal sense, the machinery of industrial France and Belgium. The theme of Mr. Keynes' book stated very briefly and crudely, is that it cannot again work with anything like its former efficiency until the damaged cogwheel has been repaired. It was, of course, Germany's own action which caused the damage in the first instance but the action of the Peace Conference has only made matters worse. Mr. Keynes saw the working of the Conference from the inside for he was the official representative of the Treasury and also acted as Deputy for the Chancellor of the Exchequer on the Supreme Economic Council. Indeed, the impression one gets is that he was far too close to the chief actors in the drama which unfolded itself at Paris to be able to judge them fairly. He certainly does not spare them. President

Wilson had "not even much of that culture of the world which marks M. Clemenceau and Mr. Balfour as exquisitely cultivated gentlemen of their class and generation. More serious than this he was not only insensitive to his surroundings in the external sense, he was not sensitive to his environment at all. And "he did not seek to remedy these defects by seeking aid from the collective wisdom of his lieutenants." M. Clemenceau "was by far the most eminent member of the Council of Four and he had taken the measure of his colleagues. He alone had an idea and had considered it in all its consequences. His age, his character, his wit and his appearance joined to give him objectivity and a defined outline in an environment of confusion. One could not despise Clemenceau or dislike him, but only take a different view as to the nature of civilized man or indulge, at least, a different hope." Mr. Lloyd George is not so trenchantly dealt with and Mr. Keynes' views of him have to be inferred from such asides as the following. "To see the British Prime Minister watching the company, with six or seven senses not available to ordinary men, judging character, motive and subconscious impulse, perceiving what each was thinking and even what each was going to say next, and compounding with telepathic instinct, the argument best suited to the vanity, weakness or self interest of his immediate auditor, was to realize that the poor President would be playing blind man's buff in that party." There is no light and shade about this portraiture. It is impossible to believe that Mr. Clemenceau was as cynical, Mr. Lloyd George as diabolically clever in certain directions or President Wilson as much at the mercy of both of them as Mr. Keynes makes out. The truth is that not only was the hour too great for the men but it was too great for any man. Face to face with the consequences of a world catastrophe of appalling magnitude, the greatest intellects were but as those of pygmies. We cannot but think

that Mr. Keynes errs in attributing the defects in the Peace Treaty so exclusively to defects in the characters and temperaments of the men who made it.

From his dissection of the men Mr. Keynes proceeds to the dissection of their work. His two main propositions are that the terms of the Treaty were not in accordance with the terms of the Armistice and that, in any case, the sums which it is proposed to demand from Germany are excessive and impossible to obtain. As regards the first of these, everything turns on the interpretation of the second of the two great qualifications, subject to which the Allied Governments declared their willingness to make peace with Germany on the terms laid down in President Wilson's address to Congress of January 8, 1918, and the principles of settlement enumerated in his subsequent addresses. The Allied Governments stated that they understood that "Compensation will be made by Germany for all damage done to the Civilian population of the Allies and their property by the aggression of Germany by land, by sea and from the air". Mr. Keynes' holds that these words are perfectly plain and are capable of only one interpretation. Their meaning cannot be stretched to cover the demand for the payment of pensions and separation allowances thus raising by £5,000 millions a claim which in Mr. Keynes' opinion amounts to not more than £3,000 millions. It is interesting to learn from a recent book by Mr. B. M. Baruch, one of the President Wilson's chief advisers on financial and economic questions at the Peace Conference, that it was a memorandum by General Smuts which finally removed the President's objections. General Smuts is a great man and a great statesman but, notwithstanding the weight which attaches to his opinion, we think that Mr. Keynes' is right. If his other conclusions are accepted, the question becomes for practical purposes one of academic interest, for the claims on Germany which undoubtedly come

within the Armistice terms represent more than she can ever hope to pay. His estimate of the compensation due from Germany for what may legitimately be regarded as damage done "by land, by sea and from the air" is profoundly instructive. For Belgium he places the figure at £500 millions and as this is so much below what most of his readers must have expected, it is worth-while seeing how he arrives at it. He points out that Belgium is a small country and that the actual area devastated by the German hordes was only a small proportion of the whole. After the first onrush of the Germans, the battle line was practically stationary and hostilities were confined to a corner of the country much of which, in recent times, was backward, poor and sleepy and did not include the active industry of the country. The official survey of the wealth of Belgium published in 1913 by the Finance Ministry placed the total wealth of the country at £1,181 millions. A total of £1,500 millions would, in Mr. Keynes' opinion, be fairly liberal. The actual physical loss by destruction and loot he would put at not more than one-tenth of this or £150 millions as a maximum. Claims in respect of levies, fines, requisitions and so on might amount to a further £100 millions. In view of the special position of Belgium in regard to reparation as admitted by the Germans themselves, the sums advanced to Belgium by her Allies for the general costs of the war, including the cost of relief, have to be added. These amount to about £250 millions and bring for France, Mr. Keynes' figure is £800 millions. £500 millions the total up to £500 millions of this are for physical and material damage to the occupied and devastated areas and £300 millions for other heads such as loans and requisitions on the occupied areas and losses of the French mercantile marine. Great Britain's bill, on the same basis is £570 millions, mainly for losses of merchant shipping, and the total for all the other Allies is £250 millions. The total is thus £2,120 millions and Mr. Keynes'

conclusion is that a claim against Germany based on the interpretation of the pre Armistice engagements of the Allied Powers which he has adopted would assuredly be found to exceed £1,600 millions and to fall short of £3,000 millions. He, therefore, holds that the German Government should have been asked to agree to pay a sum of £2,000 millions without further examination of particulars.

So much for the claim. What of Germany's ability to meet it either immediate or prospective? Nothing worth speaking of can be expected in the form of gold and silver, for any withdrawal of the precious metals would ruin the German currency system altogether. The maximum contribution from surrendered shipping and from saleable securities held by Germany abroad may be put at from £250 millions to £350 millions whilst £80 millions would be a liberal estimate for the value of property incited territory or surrendered under the Armistice. The sum total is thus £330 to £430 millions but Mr. Keynes is careful to point out that nothing like this sum is available for reparation as the first charge on it is the cost of the Armies of Occupation and the second the cost of necessary food and raw material which the Allies consider it essential that Germany should have. After making deductions for these charges, we are left with from £100 to £200 millions and as Belgium has secured first claim on this, the upshot of the whole matter is that Belgium may possibly get her £100 millions by May 1921, but that none of the other Allies are likely to secure anything at all.

This brings Mr. Keynes to the question of annual payments. He examines in detail the statistics of Germany's trade before the war and points out that for the five years ending with 1913, her imports exceeded her exports by £74 millions. In what commodity is she to pay. In coal and coke? The value of Germany's net export before the war was £22 millions. The Allies have agreed

that for the time being 20 million tons is the maximum possible export and, on this basis, there is no increase in value measured in pre-war prices. In woollen or cotton goods? An increase in pre-war values is impossible without the raw wool or cotton and having regard to other claims on supplies, a decrease is likely. Dyes? Their total value in 1913 was £10 millions. So on down the list. On the side of imports rather more is possible. By lowering the standard of life, an appreciable reduction of imported commodities might be effected. But many large items are incapable of reduction without reacting on the volume of exports. Mr. Keynes' final conclusion, therefore is that, including all methods of payment—immediately transferable wealth, ceded property and an annual tribute,—£2,000 millions is a safe maximum figure of Germany's capacity to pay. In all the actual circumstances, he does not believe that she can pay as much. "Let those who consider this a very low figure bear in mind the following comparison. The wealth of France in 1871 was estimated at a little less than half that of Germany in 1913. Apart from changes in the value of money, an indemnity from Germany of £500 millions would, therefore, be about comparable to the sum paid by France in 1871, and as the real burden of an indemnity increases more than in proportion to its amount, the payment of £2,000 millions by Germany would have far severer consequences than the £200 millions paid by France in 1871."

We cannot but think that 'Mr. Keynes' criticisms of the provisions of the Peace Treaty regarding the surrender of shipping, the expropriation of German private property, the demands on Germany for coal and iron, and the transport and tariff systems should have followed his examination of Germany's capacity to pay instead of being made in an early Chapter of the book for their main point is that they reduce still further Germany's ability to meet the demands upon her.

The truth is that the Peace Treaty represents a compromise between two points of view. There were those who wished Germany crushed completely and there were those who recognized that if Germany were to contribute any sum worth having towards the cost of the war, it would be folly to deprive her entirely of the means wherewith to do so. The Treaty achieves neither the one aim or the other. Its vital defect, in Mr. Keynes' view, is that it includes no provision for the economic rehabilitation of Europe, which, unless the terrible inflation of its currency system is speedily reduced, is heading towards another catastrophe. It is, at any rate, reassuring to find that Mr. Keynes does not see in England the slightest possibility of such a catastrophe or of any serious likelihood of a great upheaval of society. "The war has impoverished us but not seriously." A National Debt of nearly £8,000 millions seems serious enough in all conscience and we think Mr. Keynes, like other economists, attaches too much importance to the fact that the greater part of it has been borrowed at home. This, however, is by the way. What is to be done for the continent of Europe? The first thing is to escape from the atmosphere and methods of Paris. The Peace Treaty must be revised, and the demands on Germany must be limited to £2,000 millions. Of this the value of property already surrendered should be taken as £500 millions. The balance should be paid in thirty annual instalments commencing with 1923 and should not carry interest pending its repayment. The Allies' option on German coal should be abandoned except that Germany's obligation to make good France's loss of coal through the destruction of her mines should remain. A free Trade Union should be established under the auspices of the League of Nations of countries undertaking to impose no protectionist tariffs whatever against the produce of other members of the Union. Indebtedness between the Governments of the Allied and

Associated countries should be wiped out. Mr. Keynes holds that this proposal would involve the United Kingdom in neither loss nor gain. The external debt of the United Kingdom, some £842 millions, is only owed to the United States whilst she is owed £1,740 millions mainly by France, Italy and Russia. The debt from Russia, £568 millions, may be written off and Mr. Keynes thinks that the loans from the United Kingdom to the Allies as a whole can be reckoned at not more than half their face value. On this hypothesis, the United Kingdom is owed £870 millions and owes £842 millions. It will be noticed that Mr. Keynes writes down one side but not the other and the proposal amounts to this that, as happened after the Napoleonic wars, it will be the United Kingdom, of all the European powers, that will have to pay the biggest bill for freeing Europe from the despotism of a tyrant. We have said "of all the European powers" for, Mr. Keynes' proposals were accepted, the United States would wipe out a debt of £1,900 millions. We hardly think that Mr. Keynes' views are likely to find favour in America. The financial sacrifices of the United States have undoubtedly been, in proportion to her wealth, immensely less than those of the United Kingdom but she is showing no inclination to make any more. Possibly she might agree to Mr. Keynes' next proposal and assist in raising an international loan for the benefit of distressed Europe. The telegraphic summaries of the report of the Brussels Conference which is in session at the time of writing mention that a system of international credits is being evolved so that Mr. Keynes' ideas on this point are being put into practice. Most disputable of all is his view that German enterprise and organization must be utilized to restore the productivity of Russia. German "enterprise and organization" are largely responsible for the present state of Russia for German influence has done much to secure the triumph of the Bolsheviks.

(One would have thought, especially after Mr. Keynes' gloomy picture, that the task ahead of Germany, even if the indemnity is reduced to his figure, was sufficient to occupy all her energies for at least a generation. In any case, German penetration in Russia cannot be permitted until German good faith becomes more evident than it is at present. But with the main theme of Mr. Keynes' book we are in cordial agreement. Germany, drastic though her punishment deserves to be, cannot be left in the position of the Indian ryot who never knows how much he owes the sowcar. All he does know is that the debt goes on mounting up and that he will never be able to pay it. He is deprived of all incentive to reduce it and sinks into a state of hopeless apathy. As we write, we note that Mr. Lloyd George has expressed himself in favour of the fixation of the indemnity at a definite figure. That is all to the good but the figure must be a reasonable one.

The demand for electric lamps in Japan is rapidly increasing, and with the completion of the many new power plants under construction and projected, the home market may be expected to keep the factories busy. About 80 to 90 per cent of the output is manufactured by the Tokyo Electric Co.,—the Japanese branch of the General Electric Company—but other companies are forging ahead producing lamps of excellent quality using the tungsten filament, says the *Far Eastern Review*. The leading competitor is the Dai Nippon Electric Bulb Company. The Kobe Electric Lamp Company, the Tokyo Taguro Electric Lamp Manufacturing Co., the Lion Lamp Company, S. Kondo & Company, and the Nippon Chisso Lamp Company are also building up large businesses.

STORES PURCHASE COMMITTEES REPORT

[The following is a summary of the conclusions and recommendations of the Stores Purchase Committee appointed by the Government of India :—Ed. M.E.J.]

SCOPE OF ENQUIRY.

The following summary of our principal conclusions and recommendations is intended to provide a birds-eye view of the contents of the preceding report; we do not attempt here to review points of detail, or to recaptulate the reasons which have led up to the judgments formed, but refer the reader to the appropriate chapters and paragraphs.

The committee was appointed in view of the necessity of encouraging Indian industries while at the same time securing economy and efficiency, to enquire and report on the measures required to enable government departments to obtain their requirements as far as possible in India; to devise the necessary organization; to suggest the nature of its internal and external relation; and to indicate the modifications necessary in the stores purchase rules.

In the course of our enquiries, we have considered it necessary to make a comprehensive survey of the subject matter, and our investigations have, therefore, had reference to the general question of the supply of stores of all sorts for government departments, railways and *quasi*-public bodies; and have comprised a review of the conditions governing the purchase both of indigenous and of imported stores, as well as of ships.

Under peace conditions, imported stores forms a preponderating part of the purchases which we have reviewed. Under war conditions, the ratio between such stores and those of local origin was modified in favour of the latter, but imported stores still represented one-half of the total.

In suggesting the details of the proposed Indian stores department, we have decided that, in view of the great expense which would be involved without corresponding advantage, the establishment of central stock depots would be justified.

GOVERNMENTS' STORES PURCHASE POLICY.

A review of the stores purchase policy of the Government of India from the year 1862 onwards leads to two prominent conclusions :—

- (i) that the Government of India have not been generally successful in the efforts made by them from time to time, to procure relaxations of the stores rules, in respect of the encouragement of local industries and of the local purchase of imported stores;
- (ii) that this failure has been contributed to largely by the influence of the store department of, and the Consulting Engineers to, the India Office.

With the establishment of an efficient department in India for the purchase and inspection of stores the time has, we consider, now come when the Secretary of State should delegate to the Government of India full control over the details of the Stores Rules. Complete freedom should be granted to India in this matter; and it should be accepted as a policy, not only in theory but also in practice, that all stores required for the public service shall be obtained in India whenever they are procurable in the local market of suitable quality and reasonable price, preference being given to articles of Indian origin.

We anticipate that the work devolving upon the Director-General of Stores, India Office, will be reduced, and consider that his department should, in due course, be reconstituted as the London Branch of the Indian Stores Department, the status of the officer

in charge becoming that of a Director, immediately subordinate to the Director-General of Stores in India. As an interim measure, and pending the above development, we recommend the transfer of the existing organization of the Director-General of Stores, India office, from the immediate control of the Secretary of State to the charges of a High Commissioner for India.

A review of the existing methods of purchase in the several departments of the public service shows that local officials are at present, greatly handicapped for want of information regarding, and facilities for using existing Indian resources owing to the absence of any central authority possessed of comprehensive knowledge, and of an organization capable of not only placing orders but also seeing that they are properly met.

MORE FREEDOM OF CONTROL URGED.

A consideration of the existing practice of Government with regard to the maintenance of factories and departmental workshops indicates the necessity for the adoption of a more consistent policy of reliance, in ordinary cases, upon private enterprise, although we recognize that Government factories may properly be retained in some cases on grounds of convenience, and, in others, of expediency. We question the validity of the argument sometimes advanced as to the relative economy of Government factories; but even if this could be substantiated, we do not think that it should determine the decision of Government. Some of the existing factories could in pursuance of the above policy, be either reduced in scope or altogether abolished.

In view of the tenor of the Reforms Act, we consider that local Governments should, in future, be free to deal, as they wish, with purchases of stores, of indigenous origin or local manufacture, for their own requirements. Having regard, however, to the influence which the adoption of a sound policy, in respect of the methods by which

imported stores are procured, may be expected to have upon the industrial development of India, we consider that the purchase of imported stores should continue to be controlled by the Government of India, so far as regards policy though not as regards the precise mechanism utilised. Local Governments should not be bound to utilise the agency of the Indian Stores Department, though they would be free to use it if they so desire; and we have provided special facilities to enable them to do so.

Companies, which work government railways are free agents as regards purchase of stores. Under their existing contracts, they could not be compelled to conform to the policy approved by Government, nor to utilise the Indian Stores Department, though it is hoped that they will generally do so. We suggest that, when new working contracts are framed, opportunity should be taken to require the railway companies to conform to the Government of India system and procedure. Indian Native States and *quasi*-public bodies, such as municipal ties, should be free to utilise the services of the new department subject to a reasonable payment.

PREFERENCE TO INDIGENOUS STORES.

As regards stores of Indian origin, the principal ground for complaint at present is, that the expressed policy of Government in favour of the purchase, by preference, of such stores, rather than of imported articles, is defeated by the prevailing lack of information amongst Government officers, of the available resources of the country by the difficulty they experience in making the close comparison of price now required, and by their defective equipment for making use even of such resources as are within their knowledge. The result is that officers are induced to adopt the line of least resistance, and to obtain stores of extraneous origin when, with better facilities, they might obtain instead suitable goods of Indian manufacture. This reacts prejudicially on the development of Indian industries, and on

the economy and convenience of the public service.

The remedy is to be found in the establishment of an expert purchasing agency in India, equipped with facilities for knowing the manufacturing resources throughout the country; able to purchase efficiently in the various markets of India; and competent to carry out such inspection as may be necessary. The Indian Stores Department, the establishment of which is thus indicated, must have authority and facilities to ensure that orders shall, in accordance with the accepted policy of Government, be placed in India for goods of local production whenever possible, and that imported stores shall only be purchased when suitable Indian goods are not procurable.

We consider that, in addition to providing in this manner for the full utilisation of existing industries in India, Government must further give them practical encouragement, especially in the initial stages of their enterprise, and must assure them of a reasonable measure of protection against outside competition. The measures advocated by us, subject to appropriate restrictions and safeguards, are :—

- (i) guarantee of orders for a limited period;
- (ii) placing of orders at favourable rates for a limited period;
- (iii) favourable railway rates,
- (iv) revision of the fiscal policy of Government, with a view to the protection of local industries;
- (v) adoption of a conventional rate of exchange in effecting comparisons between prices quoted for indigenous and imported goods of the same class.

We consider that the conditions under which contracts are placed in India should be assimilated to those attaching to contracts entered into by the Director-General of Stores, India Office, which at present are in

some respects more favourable to the British manufacturer.

DEVELOPMENT OF INDIAN INDUSTRIES.

The purchase of such stores as are not, procurable of local manufacture is, at present regulated artificially by rules, the effect of which is practically to prevent, in ordinary cases, such stores being purchased in India from dealers or other. We agree that the time has come when such artificial restrictions should be abolished, and that it should be open to officers responsible for the purchase of imported stores to take advantage of the cheapest available market in which suitable articles can be obtained, having due regard to the convenience of rapid supply and other special advantages. The several channels through which these stores might be purchased should thus be free to compete with each other on their merits. We anticipate that, in practice, it will be found advantageous to procure certain classes of imported stores considerably more freely than hitherto through the agency of branches, agents and dealers in India. The demands placed on London will thus be reduced in two distinct ways :—

- (i) by the interception demands for imported stores for which articles of Indian manufacture can be submitted, and
- (ii) by the increasing purchase of imported stores in India instead of the United Kingdom.

Efficient arrangements for inspection are of great importance; it is on the distinct understanding that all stores purchased will be subject to examination, either during manufacture or before acceptance, that our main recommendations are based. In view of the intention that the Indian Stores Department should be as an instrument for the development of Indian industries, its inspection staff will be responsible, not merely for the detection of faults but also for indicating to suppliers the steps necessary to improve

the standard of their manufactures, and for the introduction of standardization of all articles in general use.

DETAILS OF PROPOSED ORGANIZATION.

We recommend the institution of inspection depots at suitable centres to facilitate the examination of certain classes of goods. At each depot a pattern room should be maintained.

A portion of the existing ordnance inspection staff should ultimately be absorbed and because of the conditions attaching to the use of military stores, certain military officers should be deputed from the Army for employment as liaison officers with the Indian Stores Department. The Inspection branch of the department should absorb the existing staff of the Metallurgical Inspector, Jamshedpur; and the inspection and Test House staff at Alipur. A test house should also be established in Bombay.

For the encouraging of shipbuilding, we recommend the liberalisation of the existing rules governing the supply of ships for the public service, with a view of utilising the capacity of Indian shipyards, and of promoting their development.

Having regard to the relaxation which will be desirable with the alteration in conditions in India in future, and to the complicated nature of the existing rules governing the purchase of stores for the public service, we have recast the rules with special attention to the provision of a clear enunciation of the policy of Government; to making effective the intention of giving all reasonable preference to the products of Indian industry: to the substitution, for existing arbitrary restrictions, of a more business like latitude in regard to the channel of supply of goods of foreign origin; and, to the exercise of judgment in the comparison of competitive tenders.

We have set out the details of the organization which we propose for the Indian Stores Department, both in its initial and ultimate

form, and have indicated the range and nature of the duties of the staff to be employed in the several sections on both the purchase and inspection sides. The organization set forth provides for a head-quarters staff, divided into purchase and intelligence and inspection branches and a general office, assisted by provincial agents and inspectors at the chief centres of industry. The provincial agents will provide special facilities for meeting the wishes of local Governments in regard to supply of stores, and will act as intelligence agents of the Indian Stores Department in close collaboration with the provincial Directors of Industries. We have laid down the extent to which the use of Indian Stores Department should be compulsory, and that to which it should be optional for the several departments of Government and others concerned.

For the convenience of the various authorities interested, we have set forth in some detail the procedure, which we contemplate should be adopted, both by the department's which utilize the Indian Stores Department, and by the department itself in dealing with the demands preferred upon it.

RECRUITMENT FOR SERVICE.

In the important matter of recruitment we have indicated the qualifications to be looked for in the several members of the staff whose employment we think necessary, and the sources from which they should be obtained. While indicating that, at the commencement, expediency must be the principal guide in selecting officials of suitable experience to fill the various posts, we make it clear that, once the department is fairly established, it will generally be advisable, at least on the administrative side, to engage only junior men in each branch, and to fill vacancies by promotion. We recommend that, whenever suitably qualified men can be obtained in India to fill vacancies, preference shall be given to statutory natives of India.

The question of interchange of staff between the Indian and English establishments

specially dealt with, and, in this connection, we have drawn attention to the advantage to be expected from the transfer of some of the experienced establishment of the India Office Store Department to fill some of the new appointments in India.

THE FINANCIAL SIDE.

We contemplate close association between the officer of the Finance Department in charge of the Accounts Section and the headquarters officers, and branches of the Indian Stores Department; and we lay stress upon the importance of their connection, with a view to the prevention of delays in payments of bills for stores supplied, and to the avoidance of friction. We contemplate that bills shall be paid from head-quarters, and that debits shall be transmitted by the Accounts Section to the departments concerned. Particular attention is invited to the necessity for the observance of ordinary commercial practice in respect of the prompt settlement of accounts.

The details set out by us show that the additional net annual cost of the Indian Stores Department may be estimated at Rs. 14,60,000, a figure which, though considerable in itself, is relatively small, and represents only about two per cent of the value of the stores which we anticipate will be handled each year. The estimates, particularly of the volume of stores to be dealt with, are unavoidably speculative; but even if the ratio of the cost of the department to the value of stores handled should prove to be appreciably higher than we anticipate, it is still very unlikely that it will reach an unreasonable figure.

COTTON SPINNING MILLS.

BY "X"

THE cotton spinning industry in India is comparatively speaking only in its infancy, but in recent years, it has made such rapid strides that it has a future before it, perhaps only second to the vast cotton industry of Great Britain. In fact the Lancashire Mill-owners have already recognized with some apprehension the growing importance of cotton trade in India and even as far back as 1886, Mr. Thomas Ellison, an eminent Liverpool cotton broker, has recorded in his valuable treatise on the cotton trade of Great Britain that England's most formidable rival and competitor in the cotton trade is India.

The above conclusion can be proved by an examination of the relative positions of India and England with respect to (1) cost of raw material, (2) cost of mills and machinery, (3) cost of power, (4) cost of labour, and (5) cost of reaching the consumer, all of which go to make up the cost incident to the spinning of cotton.

(1) India has a distinct advantage over England with regard to the cost of raw material. India has a bountiful supply of raw cotton for the spinning of coarse counts. Even with regard to material for medium and fine spinnings it may be possible to cultivate them to a large extent by an application of scientific and technical skill in cultivation.

(2) Although England has the advantage over India with regard to the cost of mills and machinery, yet this advantage is more apparent than real, being fully counter-balanced by the number of working hours in India being much greater than in England and thus considerably reducing the charge every pound weight of yarn spun, represented under the head of rent, depreciation and interest.

(3) With regard to the cost of labour, India enjoys a great advantage over England. It is true that the latter possesses skilled labour, the like of which it is impossible to recruit in Indian mills. But the wonderful automatic cotton spinning machinery of to-day supplies the intelligence—the advantage possessed by the skilled labourer over his unskilled brethren and only requires the workman “to follow up” by devoting his attention to the simple details of the working.

(4) Coming to the cost of power, India is under a decided disadvantage as compared with England which has an unfailing supply of coal. The development of Indian coal-fields and the use of petroleum as fuel may likely turn this disadvantage into an advantage.

(5) Being in the very centre of Asiatic countries which are the largest consumers of cotton cloth in the world India enjoys an advantage with regard to the cost of reaching the consumer which it would be very hard for England to compete with successfully.

It is evident from the foregoing that there is a bright future before the cotton spinning industry in India and that this industry offers a wide and rich field for capital and enterprise which it is hoped would be availed of with success by the enterprising capitalist of this country.

The erection of a spinning mill is however an expensive undertaking and the following points in connection with such an undertaking should have to be carefully considered before any action is taken thereon.

(a) The first and foremost consideration which ultimately has direct bearing on the successful working of a spinning mill is with regard to the provision of ample funds for the erection of a substantial building on the latest and most approved plan, equipment of the best and the most perfect types of machinery and for maintaining a surplus for working expenses. The starting of a spinning mill on a moderate scale, *i.e.*, with

10,000 spindles would likely require a working capital of at least 15 lakhs of rupees.

(b) *Location of Site.*—If the necessary amount of capital required for a spinning mill is forthcoming, the next question to be decided is the location of the mill. Cotton spins best in an atmosphere naturally warm and humid and it is most desirable, other circumstances permitting, to locate the mill where nature has supplied this all important aid to good spinning. Where nature has not been bountiful in this respect, this deficiency has been supplied by the use of mechanically worked humidifiers working in various systems. Of these the Vortex system, has obtained a high reputation in India. This machinery is obtainable from Messrs. Mather and Platt, Ltd., Manchester.

Other important points to remember in deciding upon the choice of the site are—(1) It would be advisable to start the mill in or near a cotton spinning centre so as to facilitate the recruiting of trained and experienced hands in mill work. (2) The question of facility of transport should also be considered when deciding upon location since the cost of transport is one of the larger items of expense. (3) The proximity to an abundant and never failing supply of good soft water for feeding the boiler and for dyeing and bleaching purposes should also be kept in view. (4) Cost of fuel and the building material and the facility for their transport also play a prominent part in determining the site for the location of a spinning mill.

(c) *Building.*—The building for a mill must be well constructed, and the materials used in the construction should be very good. The floor space that may be required for installing spinning machinery with 10,000 spindles would approximately be about 50,000 sq. ft. To this must be included space for officers quarters, hospital for the workmen, technical school, recreation ground, etc. A ground covering an area of 2 acres would give sufficient accommodation for

erecting buildings of all kinds required for a mill with 10,000 spindles.

The mill may be constructed in the form of either a storied building or a shed. The majority of the mills are however of the latter type which follows the Saw Tooth principle, the light facing the north, glass roofs running east to west, the glass at an angle of 30 degrees to the vertical height of roof 20 ft., height of the gutters from the floor 15 ft. and the height of the line shaft 12 feet. The cost of the building and site would vary according to local conditions but may be put down at 3 to 4 lakhs of rupees.

(d) *Method of Driving*.—Transmission of power to all the machinery is effected by steam engines and Lancashire boilers. Messrs. Musgrave, Ltd. of Bolton deal with high class of machinery required for driving.

(e) *Machinery*.—The following machinery would be required for a spinning mill with 10,000 spindles.

1. Hopper Bale Breaker.
2. Improved Thread Extractor.
3. Roving Waste Opener.
4. Hopper Feeder combined with
Porcupine Beater
Dust Trunks
Crighton Opener
Exhaust
Breaker Scutcher.
5. Intermediate Scutchers... 2.
6. Finisher Scutchers ... 2.
7. Cards ... 40.
8. Drawing Frames ... 5 sets.
9. Slubbing „ ... 5 (92 spindles each)
10. Intermediate „ ... 9 (126 „ „)
11. Roving „ ... 16 (160 „ „)
12. Ring „ ... 32 (320 „ „)
13. Reels ... 8
14. Pirn Winding Machines. 7 20 „ „

They could be had from:—

1. Howard and Bullough, Ltd., Accrington, England.
Agents:—Messrs. Greaves Cotton & Co.,
Forbes Street, Bombay.
- (2) Wilson & Longbottom, Bransby, England.
- (3) Asa Lees & Co., Soho Iron Works, Oldham.
Agents:—Messrs. W. H. Brady & Co., Church
Gate Road, Bombay.

- (4) John Hetherington & Sons, Ltd., Manchester.

Agents:—Messrs. Felber Jucker & Co., Ltd.
Bombay and Manchester.

- (5) Dobson & Barlow, Ltd., Bolton.

Agents:—Messrs. H. M. Mehta & Co., 123,
Esplanade Road, Bombay.

- (6) Hacking & Co., Ltd., Bury, Lancashire.

Agents:—Messrs. H. M. Mehta & Co., 123,
Esplanade Road, Bombay.

- (7) Henry Livesey Ltd., Blackburn, England.

- (8) Brooks & Doxey Ltd., Manchester.

Agents:—Messrs. Sorabjee Shapurjee & Co.,
303, Hornby Road, Fort, Bombay.

At present all the manufacturing firms are booked with orders for 4 years to come and regret their inability even to quote prices. They are, however, prepared to take in any order which may be placed with them now and supply the machinery after the execution of all orders on hand at the prices ruling at the time of delivery. The total cost of all machinery required for a spinning mill with 10,000 spindles would approximately be about six lakhs.

Variety of cotton to be spun into yarn.—

One of the most important questions which will have to be solved before a spinning mill is started is with regard to the varieties of cotton to be spun into yarn and the number of counts up to which the mill wishes to spin yarn. The market for which the yarn is intended has also to be considered.

At present yarn spun by power machinery in India is mostly of counts below 30s. and although some mills spin to a very limited extent finer counts of yarn from 30 to 60s. and even to 80s. from the American and Egyptian cotton, yet the bulk of yarn manufactured is from Indian cotton and is usually of 4s. to 20s; the lower counts up to 22s. are produced in greater quantities than the finer counts.

The spinning mills in India are more favourably placed with regard to the five elements detailed in paragraph 2, than the spinning mills in the United Kingdom but yet their success is more limited than that of the latter owing to material differences in the

aim, method and principles of work followed by these mills.

The British spinning mills spin yarns from cotton imported from America, Egypt and India. They aim primarily at supplying the exact requirements of the local consumers—the weaving mills of England—and any excess left after meeting the local demand is exported for consumption in foreign countries. Each spinning mill specialises in a certain range of counts, put down their plants of machinery accordingly and try to spin those particular ranges of counts in an uniform if not ever improving quality and endeavour to turn out the maximum quantity in as short a period as possible and thus reduce their cost of production to a minimum. This they do by using a better grade of cotton than what may be actually necessary for their requirements and thereby eliminate unnecessary waste in production and also ensure steady and continuous work done with ease by their employees. The energy of these people thus preserved is utilised in making them attend to the maximum number of machines. This arrangement is no doubt costly as the employees have to be paid better wages but it aims at the maximum production per head and thereby reduces the cost of production to a minimum.

The yarn spun by these mills are subjected to most exacting and critical tests and if any further improvements are required by the purchasers, the mills are prepared for making them provided the purchasers offer them higher rates.

In short the English spinning mills aim at spinning yarns which can find a large and profitable sale in the best markets of the world.

The Indian spinning mills are on the contrary, confining their activities to the spinning of the same range of counts throughout the country. They do not specialise in any particular counts or qualities of yarns and although each mill has its own label under

which its yarn is sold, yet none of them can boast of having any particular standard of quality they are trying to maintain. This defect is due to the mills selecting cotton for their requirements more with a view to being able to produce yarns for being sold at a competitive price in the market than with a view to maintaining an uniform and particular standard of quality. It is, therefore, natural that these mills utilise a larger number of employees, make more waste in their process of manufacture, have irregular quality and quantity of production and incur greater productive costs than the English spinning mills.

One of the grave mistakes committed by the Indian spinners is that they would sooner spin yarns for sale to China and other places than cater to the requirements of the local purchasers in India. Yarns exported to China have to travel a long distance and take a good deal of time before they reach the hands of the weavers and so, any defect in the quality, counts and reeling of the yarn is seldom if ever traced back to the men at fault. Thus, the spinners are the lords of the situation and do not, therefore, care to make any attempt at improving the quality of yarn spun by them. The advent of Japan in the China market has, however, opened the eyes of the Indian spinners and some of them have already recognized the necessity for catering to the requirements of the weaving industry in India. This should be the aim of every cotton spinner in India and those that contemplate the starting of a spinning mill should fully bear this in mind.

(g) There is still another important consideration which does not seem to have been fully recognized by many of the mill-owners in India, and this is with regard to the selection of capable men to manage the mills. In every undertaking, good management is indispensable to success and in such expensive concerns as cotton spinning mills, which require a very large amount of capital to be invested in them for manufacturing purposes,

the proprietors should be very careful in the choice of those to whom they confide the management of their mills. Much attention has not been paid to this most important item in the successful working of a spinning mill and it has been observed by many that there is a very great room for improvement in the management and general conduct of the business in a large number of Indian mills.

The unsatisfactory state of affairs at these mills may be traced to two causes—first to having non-practical men as managers and second to the bad and vicious system of paying the agent commission on the out turn irrespective of profit or loss. To remedy these defects, the best course would be to appoint a practical man with varied mill experience as Manager. Even if the best men are not available in the country it would be advisable to get men from England. They would, no doubt, be costly but the wages would bear an insignificant proportion to the profits which they would be able to show.

It will be self-evident from the above that the following conditions enunciated by Richard Marsden, a great authority on the subject, are absolutely necessary for the successful working of a cotton spinning mill:—

"The locality must be well chosen; the site of the mill carefully selected; the mill well constructed; the machinery must be of the best for its particular purpose; and the management must be skilful, economical and thoroughly honest. Technical, scientific and commercial knowledge combined with steady industry and prudent enterprise are required to ensure success."

To such of these that desire to start spinning mills but are not in a position to completely satisfy the above conditions, the best advice that can be given is "don't"

ELEVATING THE PANCHAMA.

BY K. S. CHANDRASEKHARA AIYAR,

B.A., B.L.,

Judge, Chief Court of Mysore.

[In opening the Mysore Panchama Conference held last month at Mysore, Mr. K. S. Chandrasekhara Aiyar made a suggestive speech. In view of the importance of the question we publish the text of the speech below.—Ed., M. E. J.]

We have met here in conference to-day to discuss measures for the elevation of the classes generically known as 'Depressed,' who number, I may remind you, some 921,000 souls or nearly a sixth of the entire population of Mysore. It is a pleasure to see, amongst those present to take part in the proceedings, so many representatives of these classes, and also a large number belonging to other classes, including even some Brahmana ladies, who are all keenly interested in the work of uplift. That is indeed a hopeful sign, for the task in which we are engaged is a sacred task to which all children of the Motherland, high or low, ought to be drawn by reason of their common brotherhood.

It is hardly necessary for me to enlarge upon the present position of the classes outside the pale of the caste system. It is perhaps slightly better in Mysore than in other parts of India, particularly Malabar; but, taking it all in all, no impartial observer can pronounce it to be other than deplorable. Look at the utterly insanitary *keris* or hamlets in which they live, the ill-kept evil-smelling huts in which they are packed together, the foulness of their food and drink, their uncleanly clothes and unwashed persons, and all the other uncouth habits and ways of living which have contributed to their being regarded as untouchable by the higher classes and at the same time have exposed them to frequent outbreaks of epidemic

disease. Consider the harsh and rough treatment, the cruel and harassing restriction, to which they are subjected, of which the want of access to pure sources of drinking water and the wicked Malabar custom of distance-pollution are probably the worst. Note the abject state of poverty, often made worse by chronic indebtedness, in which the majority are sunk and which have made them helpless and improvident to a degree, as well as degrading and often disgusting nature of the tasks usually assigned to them. Contemplate the low morality, the hopeless illiteracy, the very imperfect sense of self-respect and self-control, the petty jealousies and quarrels, the sectional divisions and disunions, and not least of all, the utter lack of ambition to rise, of the desire to improve. If you put all this together, you have a picture of a mode of life which it would scarce be exaggeration to say is not far removed from that of the domestic animals. In one word, it is a condition of arrested development, mentally and morally, and of utter physical debasement.

The facts are there for all the world to see, and we cannot wipe them out by simply shutting our eyes to their existence. They form in truth a serious blot on our ancient civilisation, a veritable canker which is slowly retarding the healthy growth of the national life and will arrest it completely if not extirpated in time. But neither need we make matters worse by losing our mental balance in passionate talk about friends and enemies in the national household, in wailings about cruelty, hatred and despair. The task is one which calls for sober consideration and combined action, and that as a matter not of charity but of justice, of genuine patriotism, and in the best interests of the country and nation as a whole. To say that in elevating the depressed classes we are but elevating ourselves is to repeat a very obvious truism.

The primal source of the degradation of the Panchama (some prefer to call them Adi Dravidas) must be sought in those ancient

days when the original inhabitants of the country, the first owners of the soil, were overpowered by the Aryan invaders from the north and their following of mixed blood. The process of subjugation involved a virtual enslavement; that and the continuous and rigorous suppression practised through the succeeding ages have combined to form a class of miserable beings, which has been described as being to all intents and purposes slave population, living generation after generation uncared for, unregarded and despised.

More continuously operative than the original cause of their fall in keeping down this immense population must be admitted to be the harsh and oppressive attitude of the classes within the pale of caste towards the classes outside the pale; and this form of senseless bigotry is by no means confined to the highest or to any one caste. We need not blame the higher classes too harshly for their attitude; for they are, after all, to a large extent the creatures of their own environment, the products of a rigid system of caste, customs, and traditions. There is much truth, I think, in the explanation that not cruelty but indifference and thoughtlessness lie at the root of all these social evils. What else can you expect of people who obstinately follow customs because they are ancient even when they are decidedly injurious; who waste their substance in extravagant feasts and excessive mournings, coop up their women behind the purdah and deny their souls other scope for growth than in the performance of domestic drudgery; who rejoice in infant marriages and immature parentage for their sons and daughters, and are content to pay and to receive heavy prices for their brides and bridegrooms; who can look on without horror and an effective desire for change at the living martyrdom of virgin widowhood for the girls of their own flesh and blood?

But let that pass. We are living in times when the better sense of the nation is aroused and is beginning to arrest itself, when it is

being more and more felt that those who are hopelessly backward in the scale of progress are entitled by that very fact and of their common humanity to special consideration at the hands of those more advanced. As a matter of fact, some of the most zealous, active and single-minded advocates and workers for the cause of Panchama uplift are to be found to-day amongst the highest castes and the most aristocratic families, in the tenderest womanly hearts and the most cultured masculine intellects.

Governments and official bodies, too, have it within their power, and are as a rule disposed, to put down anything that savours of injustice and oppression, to insist that, in matters of secular concern, there shall be no privileges, partialities or disabilities based on considerations of caste, class or creed or the absence of such; that decent living, decided fitness and blameless character shall be the sole grounds for differential treatment where that is justified. It must be a source, by the way, of profound gratification to all of us that an eligible person has been found within the Panchama community to represent it on the District Board of Bangalore and on the Representative Assembly. The time has, indeed, come when, so far as the depressed-classes are concerned, it will no longer be right or even possible to deny them the opportunities and facilities for advancement that are open to all other sections of the people. A good deal of popular prejudice still remains to be overcome. How far that should be taken account of in any given case is a matter for the practical administrator which does not touch the question of principle. Meantime, public opinion at large must be educated out of its ancient habits of thought by means of conferences like this, by lectures, literature and, above all, by the living example of men and women who have given themselves up to the service of their depressed brethren. It is a slow and difficult task but all the same a necessary part of the remedial work.

It is not altogether easy to devise a perfectly satisfactory scheme of Panchama elevation, at once comprehensive, practical and economical. Ideal policies may be distilled out of the pure reason, but only the admixture of knowledge and sympathy can make them workable; the best is that which is adapted to existing conditions and adjusts itself easily to growing requirements. Most persons who have devoted thought to the subject seem to be agreed about the main lines on which the direct work of amelioration must proceed for the present, though they may differ in their views as to the details and the relative importance and urgency of the various measures. Speaking very generally, there is no question that, first of all, the general level of intelligence among the bulk of the depressed classes must be raised; and this by means of elementary education of a suitable kind, for all except the very old, to be enforced if necessary by compulsion and supplemented by the offer of free meals to the very poor, and by means of higher education, in residential institutions if possible, to promoting young men, who should be helped at the same time with liberal grants of scholarships. Moral and religious instruction should be given in school and outside, decent habits of living should be taught and higher ideals of conduct inculcated, including truthfulness, temperance, self-reliance and the civic virtues generally. Healthy dwellings in clean surroundings should be provided, as well as adequate supplies of water fit for drinking and washing. The economic condition, too, of the community, as a whole, must be actively bettered, by such measures as the formation of the model settlements, the grant of arable lands to Panchamas for cultivation on tenures conditioned against encumbrance and alienation, advances by the State for purchase of seed, implements, cattle and other productive purposes, on easy terms as to interest and repayment, special facilities for the formation of co-operative societies with a view to promote thrift, to provide

credit and to afford help in the purchase and disposal of goods, as well as to furnish a general incentive to rise above poverty and wretchedness. And then, without impairing the acquired efficiency of the community as respects their hereditary occupations, technical and industrial training should be imparted to a certain number of young men with real aptitude therefor. Suitable openings should be found as far as possible for qualified candidates partly in trade and business, and partly in the lower or higher ranks of the public service. Lastly, private agencies working in the field should be encouraged and even liberally aided with funds and facilities for developing their activities as long as they work satisfactorily and on lines approved by the Government as well as acceptable to the communities concerned.

The elaboration of these various methods of betterment is a task for experts, and I do not pretend to be one. The most important method is education of the right sort, not too literary, not ignoring the moral nature, and calculated above all to instil self-respect and an aspiration to rise above the past. I believe it is now recognized that, in designing the courses of general and technical education for the depressed, special attention must be paid to increasing the capacity to earn a decent livelihood and to the real improvement of personal efficiency. It has been pointed out that hard labour put forth by a man in his younger days to master a skilled craft or trade will be worth more to him in after life than an incomplete course of higher education. The depressed classes, from what I have seen of them, seem to have a special aptitude for industrial work; and it will be a distinct piece of disservice to them and to the country at large if the education that is given to their boys weans them away from the hereditary occupations for which they have an aptitude, without at the same time properly qualifying them for modern technical pursuits or the intellectual professions, if it tends to swell the ranks of discontented young men

who cannot compete on equal terms with the educated youth of other classes.

The compulsory admission of Panchama children into public schools is a controversial topic, which has excited a considerable amount of feeling. Our Government having already laid down a policy in the matter, it is not open to me to discuss it in this address. I may perhaps say, speaking quite generally, that, provided there is no marked disparity between the ways and manners of one class of pupils and the rest, there seems no good reason on principle why public schools maintained or supported from public funds should not be free to pupils of all classes alike. In a recent Madras communique it is pointed out that, when the Panchama has come under better influence and received some education, the difference in his cleanliness, self-respect and capacity for higher things is remarkable. And I have myself seen a number of Panchama youths who in person, refinement and manners are in no way inferior to many young men of the superior classes.

At the same time the value of special institutions in which Panchama children can be trained and taught in the earlier stages cannot be denied. And, as a matter of fact, much useful work in this direction has been done so far in the Mysore State. Nearly 700 schools for the depressed classes have been opened at various places, of which about 300 are departmental and the rest mostly aided institutions. A Central Panchama Institute, which I had the pleasure of visiting a few days ago, has been established at the capital of the State, and is being efficiently managed by a committee of non-official gentlemen, with an intelligent Panchama graduate as Superintendent; it has accommodation for nearly 200 boarders, who are taught various useful industries such as carpentry, weaving, tailoring and shoe-making, besides gardening which is compulsory for all. Boarding schools have also been opened at Tumkur and Chikmagalur. The education of girls is still in its incipient stage; but when it

does take root; it is bound to influence materially the progress of the communities concerned. Students of the depressed classes have been wholly exempted from payment of fees, and in addition scholarships are freely granted to young men studying English. It is gratifying to note that the facilities offered are being readily availed of, and that the grant of scholarships in particular has already done something, and is expected to do much more, to encourage the spread of education among the depressed classes.

A very active auxiliary in this field is the Mission for the Elevation of the Depressed classes under Royal patronage and presided over by our worthy and respected citizen, Mr. V. N. Narasimhiengar. It maintains eight schools for boys in the Mysore City, with as many as 500 pupils on their rolls, and three schools for girls with about 200 pupils; in addition it has started two Industrial Schools for boys and two for girls, in which weaving, sericulture, carpentry, needle-work and sock-making are taught. It also appears to be doing much useful work in the promotion of temperance, the settlement of disputes by arbitration, the formation of co-operative societies, the maintenance of reading rooms, the teaching of hygiene and sanitation, instruction by means of lectures and bhajanas, and other directions. This Mission affords valuable illustration of the kind of work not always to be compassed by official agency, which may be accomplished by private bodies with adequate encouragement and financial help.

Excessive drunkenness is the curse of the depressed classes. Some people hold that it may cease to be that a hundred years hence, when the craving for drink comes to be dealt with wholly as a moral and social problem without reference to the fiscal aspect. However that may be, it is perhaps possible even now to minimise its ravages, as for instance by the substitution of weaker and less unwholesome for the stronger and deleterious liquors. For men who have toiled and sweat-

ed the live-long day it must indeed be difficult to resist the temptation of the liquor-shop just beyond the corner; it is essential therefore that they should have within reach alternative forms of innocent recreation to occupy their evening leisure, such as dramas, Bhajanas and Harikathas. Night schools, too, are serviceable in this respect over and above the recommendation that they do not trench upon the wage-earning hours.

There is one other matter, of a more general character, on which I have to make a few observations; and that is with reference to the future conduct of the work of uplift. That is not, as I have already observed, a mere work of philanthropy, but one nearly touching the public interest and welfare, and requiring the close co-operation of official bodies and private agencies and individuals; its complete accomplishment will take much time, require steady effort, and entail a great deal of expense; and above all, as we have seen, it has to be carried on simultaneously on several different lines of activity. It is in these circumstances a question whether these activities may not be effectively co-ordinated, whether the forces engaged may not be concentrated in some permanent form of organization. In Madras the responsibility of looking after the interests of the depressed classes and of carrying out all schemes for their amelioration has been entrusted to a full-time Commissioner of Labour assisted by an Advisory Board. In Mysore I understand that a proposal for establishing a Depressed Classes Advancement Trust has been made by the present head of the Education Department, Mr. C. R. Reddy, who as we all know, is an officer full of enthusiasm for everything that touches the well-being of the backward and depressed classes. That proposal is before Government and therefore *sub-judice*.

But so far as this Panchama Conference is concerned, the idea occurs to me whether the opportunity of its existence may not be better utilised. The Conference, I take it, is

an annual function held under the auspices of the Mysore Civic and Social Progress Association. It is not a permanent body with a corporative existence; and beyond the fact that it is attended by representatives of the depressed classes who are deputed from the various taluks after some sort of rough and ready method of selection, it cannot be said to have a definite constitution. Speeches are made, papers are read, and resolutions are passed at each year's session. But I have not been able to gather that any continuous practical work is done in the name and on behalf of the Conference in the interval between one annual session and another, or in fact, that there is, if any, a recognized agency in existence charged with the task of carrying those resolutions into effect. This is possibly all that may have been feasible in the earlier years. But it seems worth while to consider whether the time has not come when the Panchama Conference may be placed on a permanent footing, whether, in order to utilise its labours to the best advantage and to ensure the turning out of better and more continuous practical work within the scope of its objects, it may not be formed into an independent organization—something on the lines of the Mysore Economic Conference or the Malnad Improvement Trust, but devoted specially to the cause of the uplift of the depressed classes, with branches in the various taluks and other important centres of the State. What is probably required above all else is strong and capable Executive or Standing Committee to work out the resolutions of the general body and attend to other business pertaining to Panchama welfare throughout the year. All this, including the constitution of the General body and the composition and function of the committee, is of course a matter for you to decide upon, should it commend itself to your consideration.

I think I have said nearly all that I wished to say on this occasion. I regard it as indeed a privilege to have been called upon

to preside over this Conference; more even than a privilege, I feel it to be the call of duty, which over-rides many an excuse for inaction that might otherwise leap to the mouth. I am afraid I cannot put forward the claim which was very appropriately made by the gentleman who presided last year, to be a member of the community that is in conference; that is a drawback which can scarcely be helped in my case. I cannot use the language of authority proper only to the active worker in the cause, not that of picturesque exaggeration permissible to the partisan; and, besides, an officer of Government cannot always utter his thoughts aloud. But I yield to none in genuine sympathy for my Panchama brethren, and in the earnest wish to see their condition materially improved; and I can honestly say that I desire nothing better than to see the depressed classes lifted up from the degradation of ages and provided in ever-increasing measure with the opportunities and advantages of civilisation and culture. To the forces making for that consummation, I should like to add my little mite of encouragement and hearty good wishes; and whatever be the value or use of anything I have said, I know you will take the will to serve for the deed of service.

The latest "Forest Bulletin" contains a note on pyinma, ajhar, or jarul wood (*Lagerstræmia Flos Regiæ, Retz*) by Mr. R. S. Pearson, I.F.S., F.L.S., Economist at the Forest Research Institute, Dehra Dun. The timber is found throughout Assam, Eastern Bengal and Chittagong, Burma, the South Konkan, North and South Canara, Malabar. In Assam it is in great favour for boat building, dugouts and railway sleepers; and is also used for house posts, interior wood work, for bridges and to a limited extent for furniture and spokes for carts. In Bengal it is much used for constructional purposes and bridge-building.

SUGAR PRODUCTION IN INDIA.*

Enquiries were recently undertaken by the Department of Statistics, India, regarding the sugar-producing capacity of the sugar factories in India on the lines of those made in 1918. Of the ninety factories to which schedules were sent, returns from forty only were received. Of the remaining fifty, twenty-eight did not furnish returns, ten were either closed or not in working order, six were engaged in the production of raw sugar, sugar-candy, etc., four did not manufacture or refine sugar, one did not start business, and one sold sugar-producing appliances only. Of the forty returns received, one was defective and another was not taken into account as the factory produced molasses only. The results of the census show that the thirty-eight factories, employing on an average 9,700 persons daily, produce, per day of about twenty-two hours, sugar amounting to 14,000 maunds of 82·3 lbs. each namely, 5,200 maunds from cane (first sugars), 2,100 maunds from cane (second sugars), and 6,700 maunds from raw sugar, and molasses amounting to 7,300 maunds namely 3,800 maunds from cane and 3,500 maunds from raw sugar. The maximum amount of sugar that can be produced by these factories is, according to the returns furnished, 16,800 maunds (or 617 tons) per day. The following statement shows the particulars furnished for the factories in each province:—

*Communique issued by the Department of Statistics in India.

Province	Number of factories	Sugar produced from		
		Cane—first sugars	Cane—second sugars	Raw sugar
	No.	Mds.	Mds.	Mds.
Bihar and Orissa.	14(a)	3,283	1,121	898
United Provinces.	10	957(b)	810	1,777
Madras ...	5	720(f)	98(g)	792
Bengal ...	7(a)	...	...	2,895
Other Provinces ...	2(d)	222	104	306
Total ...	38	5,182	2,133	6,668

Province	Molasses produced from		Maximum production		Average number of persons employed daily
	Cane	Raw sugar	Sugar	Molasses	
	Mns.	Mds.	Mds.	Mds.	No.
Bihar and Orissa.	2,016 ³	804	5,532	2,812 ⁵	3,544
United Provinces	1,082 ³	1,895 ³	5,041	4,747 ³	2,081
Madras ...	577 ⁴	479	2,276	1,389	2,986
Bengal ...	...	125 ⁴	3,537	217 ³	891
Other Provinces.	90	180	352	280	153
Total ...	3,765	3,483	16,758	9,445	9,652

(a) Three factories in Bengal and one factory in Bihar and Orissa worked on an average 10 hours a day.

(b) Includes production of second sugars in one factory, separate figures not being available. The high proportion of second sugars is due to the fact that ration sugar of about 97 degrees polarization manufactured for the Army Department has been classed under "second sugars."

(d) One in Burma and the other in Baroda.

(f) Includes 580 maunds from cane and raw sugar.

(g) Represents production ..

³ Excluding production of molasses in one factory in Bengal, and two factories each in Bihar and Orissa and the United Provinces, information not being available.

⁴ Includes 496 maunds from cane and raw sugar.

⁵ Excluding the figure for one factory.

The Department highly appreciates the invaluable assistance given for the second time by manufacturers throughout India in the present enquiry.

BRUSSELS CONFERENCE REPORTS.

[In forwarding the reports of the delegates for India to Brussels Conference, the Government of India in a covering letter to the Chambers of Commerce, etc., invite opinion to work out the scheme on international credits, the importance of which to India's export trade need not be emphasised. It is essential, they point out, that for any such scheme to be of practical value so far as India is concerned, bonds in question must be fully negotiable. They also emphasise that the present depression in export trade is no doubt partly due in the case of some exports to the existence of large unused stock in foreign countries but in the case of other exports it is probably due to lack of credit facilities. The following is the text of the Report of the Delegates :—Ed., *M.E.J.*]

The International Conference was convened by the League of Nations "with a view to studying the financial crisis and looking for the means of remedying it and of mitigating the dangerous consequences arising from it." The original intention was that the Conference should be held about the end of May 1920, but it was, for various reasons, postponed, and it finally assembled at Brussels towards the end of September under the presidency of M. Gustave Ador, ex-President of the Swiss Republic. In all no less than 39 States were represented, and the Conference held 17 sittings, commencing on the 24th September and concluding on the 8th October. In the invitations issued to the members of the League of Nations the Council of the League requested that each Government should send not more than three delegates conversant with public finance and banking as well as with general economic questions. The delegates appointed to represent India were :—

Mr. H. F. Howard, late Secretary to the Government of India (Finance Department),

and at present Controller of Finance, India Office.

Sir Marshall Frederick Reid, late member of the Council of the Secretary of State for India, and previously Chairman of the Bombay Chamber of Commerce.

Sir Fazulbhoy Currimbhoy, a prominent member of the Bombay business community, late President of the Bank of Bombay and for several years a member of the Viceroy's Legislative Council.

2. The Conference was opened by an address by the President, M. Ador. Copies of this, as also of the general proceedings of the Conference, have been submitted as the Conference proceeded, and the conclusions arrived at by the Conference are embodied in its report (Appendix A). It will, therefore, be sufficient in the present report to give a brief outline of the proceedings, merely referring to matters of special interest from the point of view of India. The address by the President was followed by the presentation of written statements from each country setting out its general financial situation, including its budget situation, internal and external debt, currency, exchange, foreign trade, import and export restrictions, exchange control, etc., and the present policy of each Government on these questions. These statements were introduced by each delegation in a brief speech. Many of these statements were of much interest, and the bulk of the delegations were at pains to show the efforts which their countries were making to arrange their finances, etc., on sound lines.

3. While fully realising the difficulty of the problems with which India has to deal at the present time as the aftermath of war, the Indian delegation could not fail to be impressed with her great inherent financial and economic strength, if her position be compared with that of the bulk of the participants in the Conference. To quote from the opening sentence of the Conference resolutions: (Appendix A—Enclosure I.) "Thirty-nine

nations have in turn placed before the International Financial Conference a statement of their financial position. The examination of those statements brings out the extreme gravity of the general situation of public finance throughout all the world, and particularly in Europe. Their import may be summed up in the statement that three out of every four of the countries represented at this Conference, and 11 out of 12 of the European countries, anticipate a budget deficit in the current year." Apart, too from the fact that India has emerged from the war with her resources relatively unimpaired, she stands in a special position at the present time and possesses special opportunities inasmuch as she has a surplus of important commodities to dispose of, whereas many countries are suffering from a deficiency of foodstuffs and raw materials and from a depreciation of their currencies which make it impossible to carry on the normal process of production or even to set its machinery once again in motion.

4. The written statement (Appendix B) of the delegates for India, while briefly reviewing her financial situation, brought out the fact that she is able to export considerable supplies of various commodities as regards which the Government of India had furnished information, and Mr. Howard in his speech (Appendix C) emphasised that she is anxious to so assist the world's reconstruction by doing so, provided that satisfactory financial arrangements can be made.

5. Apart from the above review of the financial and economic situation of the various countries, the main business of the Conference consisted in a discussion on financial policy. The field was sub-divided into the four following subjects, a separate debate on each subject being opened by the Vice-President, whose name is noted against it:—

- (1) Public Finance, Hon. R. Brand, England.
- (2) Currency and Exchange, Dr. Vissering, Holland.

(3) International Trade, M. de Wouters d'Oplinter, Belgium.

(4) International Credits, M. Celier, France.

6. In opening the first debate Mr. Brand gave a striking address setting out the correct principles which should govern the conduct of public finance. Mr. Howard had submitted his name to speak on this debate the acceptance of the principles set out by Mr. Brand appeared to be of fundamental importance from the point of view of the re-establishment of international credit, in which India is vitally interested; but as these principles were not questioned in any quarter, he considered it sufficient to confine himself to a few remarks (Appendix D) noting the universal acceptance with which these principles had met.

7. In the debate on currency and exchange, the delegates were in full accord with the views stated by Lord Cullen, representative of Great Britain and considered it unnecessary to intervene. A paper read by Mr. Strakosch, delegate for South Africa, with regard to the future of gold, possess special interest for India (Appendix E).

8. In the debate on international trade the question of tariffs was touched on and it seemed possible that this might be made an important issue. Sir Fazulbhoj Currimbhoj accordingly intervened in the debate to emphasise that while India was anxious to co-operate in the world's reconstruction, there was a strong body of public opinion in India which favoured a policy of protection for her industries, and he urged that the question of tariffs should be excluded from discussion as not relevant to the matters actually at issue. A copy of his remarks is appended (Appendix F).

9. Special interest centred in the debate on international credits, since this afforded an opportunity for constructive measures. The Conference had before them numerous schemes varying widely in scope and apparent practicability. That of M. Celacroix, Prime Minister of Belgium, had perhaps

attracted most attention, and formed a starting point for discussion. It was, however, generally felt that his proposals were on too ambitious a scale, and the Indian delegates think they are correct in stating that Sir Marshall Reid (vide copy of his speech as Appendix G) focussed the general sense of the Conference in urging that what was required for the purposes of reconstruction was not the setting up of entirely new, expensive and untried machinery but an attempt to repair and lubricate the machinery which was already existing though it had in large measure fallen into disuse. This point of view was further developed by Mr. C. E. ter Meulen (Holland), and a scheme outlined by him formed the basis of discussion later.

10. After the formal debates in plenary session, the separate heads of discussion were referred to general committees for the purpose of preparing draft resolutions for the adoption of the Conference. On these committees each country was allowed one representative, India's representation being as follow:—

- (1) Public Finance, Mr. Howard.
- (2) Currency and Exchange, Sir Marshall Reid.
- (3) International Trade, Sir Fazulbhoy Currimbhoy.
- (3) International Credit, Sir Marshall Reid.

Each committee in turn selected from its members a small "drafting committee," which was entrusted with the active preparation of the drafts for consideration of the main committees. Sir Fazulbhoy Currimbhoy and Sir Marshall Reid were selected to serve on the drafting committees in the case of International Trade and International Credit, respectively. The draft resolutions so prepared were, after approval by the main committees, presented to the Conference and passed without a dissentient vote.

The resolutions of the Conference (of which copies* will be found as enclosures I, II, III and IV of Appendix A) have al-

ready been published. The delegation found themselves able to subscribe to these without reservation, and it is only to the resolutions with regard to international Credit that they desire to make any further reference. The operative part of this group of resolutions is contained in paragraphs 8 and 9 of Appendix A, Enclosure IV. The scheme referred to in paragraph 8 as Annex A had the support of a number of delegates of great international experience, who expressed confidence in its practicability. Paragraph 9 of the same group of resolutions refers to a scheme put forward by Sir Marshall Reid (a copy is attached as Appendix H). This proposal was made by Sir Marshall Reid in the light of commercial experience, and he explained that he could not in any way commit his Government. The Indian delegates wish to say, however, that Sir Marshall Reid's proposal was elaborated with the full concurrence of his colleagues, who considered that its adoption would materially conduce to more normal conditions in the consuming markets, with corresponding advantages to the producers of raw materials. They suggest, therefore, that an early expression of the views of the Government of India in this matter should be obtained. For, while some delay is inevitable before a definite conclusion can be arrived at on the practical recommendations of the Conference, serious consideration of these recommendations will begin at an early date, and the various countries affected will then be expected to define their attitude at short notice.

12. Apart from the four committees mentioned above, a further important committee was appointed "to consider the principles on which the expenses of the League of Nations should be distributed among its members and to make recommendations for a new basis of apportionment." Mr. Howard was a member of this committee and of its drafting committee. The report of the committee was not published, M. Ador, the President, informing the Conference that this would be

forwarded to the Council of the League of Nations.

13. In conclusion, the Indian delegation wish to say that it has been a great privilege to them to take part in this historic and instructive Conference. The general atmosphere of courtesy and good-will, and the desire to find common ground where points of view were necessarily divergent, were very remarkable. The delegates also desire to acknowledge the great hospitality which was extended to the delegations by the Government and people of Belgium.

(Sd.) H. F. HOWARD.

„ MARSHALL REID.

„ FAZULBHOY CURRIMBHOY.

LONDON, October 14.

THE INDIAN SCHEME.

The following is Sir Marshall Reid's Scheme referred to above:

In accordance with Annexe A there will be created:—

- (a) The undertaking of the buyer to fulfil his contract.
- (b) The assurance of the buying country that he is probably capable of doing so.
- (c) The confirmation of the assurance by the Central Commission.
- (d) The bond of the buying country to be handed over to the seller for use as collateral.

While supporting the scheme of M. ter Meulen (Annexe A), the Indian Delegation are of opinion that it will serve only a limited practical purpose, and that it will be of little practical value to countries which are remote from Europe, but which produce so much of the raw materials essential for reconstruction. They are of opinion that the bonds created under Annexe A will not be acceptable as collateral except at a considerable discount by the banks abroad to which they look to finance their shipments. The large proportion of risk which will thus re-

main with the seller will seriously affect the usefulness of the scheme.

The aim of the present proposal is to create a bond which will be of value in international markets, and will be readily accepted by banks as collateral at approximately its face value, in fact will be practically equivalent to a confirmed letter of credit.

The following are the outlines of the scheme:—

- (1) The bond created under Annexe A [paragraph (d) above] would be delivered to the Central Commission instead of being handed over to the seller. The Central Commission would retain it as collateral and issue in its place a "Central Commission Bond," which would be secured under a limited joint guarantee of the countries or bodies participating in the scheme.
- (2) The Guarantee Fund would consist of an unlimited number of shares of such value as may be considered convenient. Subscribers would be entitled to an allotment of "Central Commission Bonds" which would bear the same proportion to the total permissible issue of bonds as their share contribution would bear to the total amount subscribed. Thus if the ratio of 10 to 1, as suggested in paragraph 4, were adopted, each subscriber of, say, 10,000 l. would be entitled to an allotment up to 100,000 l. in bonds.
- (3) Seeing that Central Commission Bonds would have the full benefit of the security of Annexe A Bonds, it may be fairly assumed that the calls on the guarantee would at the worst amount to a very small proportion of the transactions carried through under the collateral of the bonds.

- (4) It is therefore suggested that the volume of transactions current at one time under the system might quite safely amount to ten times the amount of the guarantee. Thus if shares were subscribed to the amount of say, 10 l. millions gold, transactions up to 100 l. millions gold be guaranteed.
- (5) Subscribers would not be required to pay for their shares in cash, but would furnish such securities as the Central Commission required; the risk of each subscriber would be definitely limited to the amount of shares subscribed.
- (6) Central Commission Bonds would be available for use only in connection with transactions between countries or bodies who were subscribers.
- (7) The Central Commission Bonds for transactions between two subscribers might be furnished either from the allotment of the buying or selling subscriber. This would provide the buying parties with bonds in excess of their allotments, provided always that they were able to furnish Annexe A Bonds for the full amount.
- (8) On the completion of the transaction, the bonds would be returned to the Central Commission who would cancel them and return the relative Annexe A Bonds to the buying country.
- (9) The maturity of the bonds would be the same as in the case of the Annexe A Bonds.
- (10) The Central Commission would publish periodical statements showing such important particulars as total bonds current and totals of each buying and selling country—also total of Annexe A Bonds of each country in its keeping.
- (11) A commission would be charged on all "Central Commission Bonds" to cover expenses and to compensate guarantors.
- (12) It might be that some countries might not find themselves in a position, for one reason or another, to participate as a nation in a scheme of this sort, but it would be quite open to a trade or section, *e.g.*, the cotton growers of America, to join in the guarantee, and to get the full pro rata benefit of it.
- (13) Bonds under Annexe A scheme would only be issued to buying countries for limited quantities of specific commodities and Central Commission Bonds would only be issued for the same commodities, but it would be open to selling subscriber independently to restrict the purposes for which their bonds should be utilised.
- (14) If the Central Commission had at any time reason to fear that heavy calls were likely to be made in the near future, they might have to consider the expediency of restricting or discontinuing the issue of further bonds until the situation cleared and it became evident that the amount of the Guarantee Fund was ample to cover the risks in outstanding transactions.

NOTE.—M. Celier, Vice-President, has kindly promised to submit these proposals to the League of Nations for the consideration of the Committee which will deal with the Conference resolutions on International Credits, particularly paragraphs 8 and 9.

THE MEULEN SCHEME.

Regarding International Credits, the Brusel Conference make the following recommendations :—

8. An international organization should be formed and placed at the disposal of States desiring to have resort to credit for the purpose of paying for their essential imports. These States would then notify the assets which they are prepared to pledge as security for the sake of obtaining credit, and would come to an understanding with the international organization as to the conditions under which these assets would be administered.

The bonds issued against this guarantee would be used as collateral for credit intended to cover the cost of commodities.

A plan based upon these principles is developed in Annex. A. It has been devised to enable States to facilitate the obtaining of commercial credits by their nationals. It is easy to see that the scheme is susceptible of development in various directions and that some of its provisions might be adapted so as to facilitate the extension of credit direct to public corporations.

A committee of financiers and business men should be nominated forthwith by the Council of the League of Nations for the purpose of defining the measures necessary to give practical effect to this proposal.

2. It has been represented to the Conference that more complete results might be achieved if the bonds used as collateral were to carry some international guarantee.

The Conference sees no objection to the further consideration of this proposal. The Committee referred to in paragraph 8 above might usefully consider the conditions under which it could be applied.

ANNEX A.—INTERNATIONAL CREDIT.

1. In order that impoverished nations, which under present circumstances are unable to obtain accommodation on reasonable terms in the open market, may be able to

command the confidence necessary to attract funds for the financing of their essential imports, an International Commission shall be constituted under the auspices of the League of Nations.

2. The Commission shall consist of bankers and businessmen of international repute, appointed by the Council of the League of Nations.

3. The Commission shall have the power to appoint Sub-Commissions, and to devolve upon them the exercise of its authority in participating countries or in groups of participating countries.

4. The Government of countries desiring to participate shall notify to the Commission what specific assets they are prepared to assign as security for commercial credit to be granted by the nationals of exporting countries.

5. The Commission, after examination of these assets, shall of its own authority determine the gold value of the credits which it would approve against the security of these assets.

6. The participating Government shall then be authorised to prepare bonds to the gold value approved by the Commission each in one specific currency to be determined on the issue of the bond.

7. The date of maturity and the rate of interest to be borne by these bonds shall be determined by the participating Government in agreement with Commission.

8. The service of these bonds shall be secured out of the revenue of the assigned assets.

9. The assigned assets shall in the first instance be administered by the participating Government, or by the International Commission as that Commission may in each case determine.

10. The Commission shall at any time have the right of making direct representations to the Council of the League of Nations as to the desirability of transferring the administration of the assigned assets either

from the Commission to the participating Government or from the participating Government to the Commission.

11. The decision of the Council of the League of Nations on this question shall be binding.

12. After the preparation of these bonds the participating Government shall have the right to loan the bond to its own nationals, for use by them as collateral security for importations.

13. The bonds shall be made out in such currencies and in such denominations as are applicable to the particular transaction in respect of which they are issued.

14. The participating Government shall be free to take, or not to take, security for the loan of these bonds from the nationals to whom they are lent.

15. The maturity and the rate of interest of the loan of the bonds shall be fixed by agreement between the participating Government and the borrower of the bonds; they need not be the same as the maturity and the rate of interest of the bonds themselves.

16. When making application to his government for a loan of these bonds, the importer must furnish proof that he has previously obtained from the International Commission express permission to enter into the transaction for which the bonds are to be given as collateral.

17. Each bond, before it is handed over by the participating Government to the importer, shall be countersigned by the Commission in proof of registration.

18. Having obtained the consent of the Commission, and received from them the countersigned bonds, the importer will pledge these bonds to the exporter in a foreign country for the period of the transaction.

19. The exporter will return to him on their due dates the coupons of the pledged bonds, and the bonds themselves on the completion of the transaction.

20. On receipt of the coupons and the

bonds, respectively, the importer will return them to his Government.

21. Bonds returned to the participating Government shall be cancelled, and may subsequently be replaced by other bonds, either in the same or in different currency, up to an equivalent amount.

22. The exporter, or if he has pledged the bonds, the institution with which he has repledged them, acting on his behalf, would be free, in the event of the importer not fulfilling the terms of his contract, to hold until maturity the bonds given as collateral by the importer, or to sell them in accordance with the custom in his country in case of default.

23. In the second alternative an option of repurchasing the bonds direct must first be given for a short period to the Government which issued them.

24. If a scale is resorted to and results in a surplus beyond what is necessary to cover the claims of the exporter upon the importer, the exporter shall be held accountable for that surplus to the Government which issues the bonds.

25. The revenues from the assigned assets shall be applied as follows to the service of the bonds.

26. Out of these revenues the Commission or the participating Government, as the case may be, shall purchase foreign currencies sufficient to meet at their due date the coupons on all bonds at any time outstanding in the different foreign currencies.

27. In addition they shall establish abroad in the appropriate currencies a sinking fund calculated to redeem at maturity 10 per cent of the bonds outstanding in each of the different countries.

28. Further, in addition to the amounts provided for payment of coupons and for the endowment of the sinking fund they shall establish out of the assigned revenues a special reserve in one or more foreign currencies for the redemption of bonds sold in accordance with paragraph 22.

29. The amount to be set aside for the special reserve shall in each case be determined by the Commission.

30. Any surplus remaining at the end of each year after the provision of these services shall be at the free disposal of the participating Government.

31. A participating Government shall have the right to offer its own bonds as collateral for credits obtained for the purpose of importations on Government account. The previous assent of the Commission will in these cases also be required for the particular importations desired by the participating Government.

32. If a participating Government which has been in control of its assigned revenues should fail to fulfil its obligations, the exporter concerned will notify the Commission and the Commission will apply to the Council of the League of Nations for the transfer of the management of the assigned revenues to the Commission.

33. The consent of the Commission is necessary whenever bonds secured on the assigned assets are given as collateral, and shall, as a rule, be accorded only for the import of raw material and primary necessities.

34. The commission may, however, at its discretion, sanction in advance the importation of specified quantities of such goods.

35. Even in the case of imports under such a general sanction a notification of the particular transaction must be registered with the Commission.

36. The assent of the Commission must also be obtained in every case to the term of the credit which it is proposed to open.

ECONOMICS IN THE WEST.

Supply of Motor Fuel.

London, 21st October, 1920.—It is becoming increasingly evident that the provision of an adequate supply of motor fuel is likely soon to be one of the principal industrial and economic problems of the day. On the one hand there are vast changes proceeding in the way of the development and extension of the uses of motors;—(America, for example, is likely to have in 1922 no fewer than 12,000,000 motor cars against less than a million in 1912.) On the other there is a steadily growing shortage in the supply of petroleum—a shortage which, failing other sources of supply being discovered additional to those now in existence, most rapidly augment in stringency as the years go by. The crisis may be postponed if the motoring world is sufficiently alert to anticipate it, but if nothing substantial is done to extend the area from which motor fuel is drawn Admiral Philip Dumas, Secretary to the Royal Commission on Oil Fuel in 1913, predicts that there will be such limited supplies forthcoming in 1922 as to necessitate the entire disuse of motor cars by private owners in this country, and presumably in other parts of the Empire which are dependent for their supplies upon the same sources. In these circumstances it is readily to be understood that great interest has attached to the proceedings of the Imperial Motor Transport Conference which has been held this week in association with the Commercial Vehicle Exhibition of the Society of Motor Manufacturers and Traders at Olympia. The Conference was un-official but the fact that it was presided over by Sir G. Beilby, Director of Fuel Research, Department of Scientific and Industrial Research, gave it an undoubted stamp of authority.

From the extremely interesting debates which took place—debates in which some of

the greatest scientific experts of the day in this particular line took part—the fact emerges that there is a wide and profitable field open for the extension of the existing sources of fuel supply. Apparently no great reliance is placed on the discovery of new petroleum oil fields though obviously there are immense possibilities in this direction in many parts of the world in which no surveys have been made or in which only imperfect investigations have been conducted. What the Conference mostly concerned itself with was the practicability of augmenting the petroleum supply by the manufacture of spirit from various natural products. In this respect power alcohol had the first claim to attention. The material from which alcohol can be distilled is of infinite variety and nowhere is it to be found in greater abundance than in the tropical regions of the Empire where climatic conditions favour cheap production. Sugar and rice straw were mentioned as suitable agencies for the manufacture of power alcohol and you in India do not need to be told that the coconut palm and the bastard date and mhowra flower are also available for spirit production. Probably there are other equally valuable sources of supply amongst tropical growths which at present have no great commercial value. The subject at all events is of transcendent importance in connection with the economic development of India and there should be hearty co-operation on your side with the efforts that are now being made here to create an alternative supply of motor fuel from outside the mineral oil field. If, as seems probable on the facts disclosed at the Conference, power alcohol has a great future as a motor spirit, there is room for a vast new industry in India—an industry which would stimulate agriculture and give lucrative employment to tens of thousands in the processes of manufacture.

Apart from power alcohol the experts are hoping to find what is needed to augment the petrol supply in products which at present

are not utilised as they might be for the purposes in view. Mention was made of Irish peat, but without any very great hopes of working the material successfully. The difficulty appears to lie in the absence of any efficient method of de-hydrating the material. If it were possible successfully to dry the peat by artificial means there would be in the Irish peat beds—a speaker at the conference asserted—sufficient deposits to produce 150 years supply of spirit, at the present rate of consumption, for the United Kingdom. It is, however, in the manipulation of raw coal that the best prospects of success are to be found. Benzol can be produced in enormous quantities from our existing supplies if we are prepared to change our methods and use coal as it should be used so as to yield this highly valuable by-product. As we were reminded at the Conference, some years since that distinguished scientist, Sir William Ramsay suggested that instead of mining coal with a great expenditure of labour, we should make the attempt to gasify the coal *in situ*. Assuming this process to be in operation we should have a series of bore holes made into the coal bed and gas produced by the right methods and drawn to the surface through other bore holes made for the purpose. The prospect of eliminating the miner altogether from the operations makes a special appeal at the present time when we are in the throes of one of the greatest—if not actually the greatest—coal strike in our history; but it is to be feared that the project is somewhat Utopian and that we shall have to rely upon more prosaic methods if we are to utilise our coal for benzol production. It was suggested, indeed, at the Conference by Professor W. A. Bone, that the idea of using coal to produce a vapour for power purposes is wrong and that we should be likely to obtain far better results if our experts concentrated upon the discovery of means by which compressed or solid fuel prepared from coal might be used for motor propulsion. He instanced lignite—

of which there are vast supplies in Canada and Australia—as a potential agent of great value, and recommended that the question of its use in the manner he proposed should be thoroughly investigated. From several points of view the Conference was of exceptional interest and importance and it should lead in the near future to developments which will aid to modify if not entirely to neutralise the effects of the petrol shortage.

THE SCHEME OF POWER TRANSMISSION.

The Scriptural turning of swords into ploughshares has its analogy in a number of the after proceedings of the great War. Most of those who followed the operations of the Air Force will remember the frequent mention of the device by which machine guns were enabled to fire bullets though the propellers of the aeroplane at the rate of 2,000 a minute. This ingenious contrivance was based on the invention of a Roumanian engineer, Mr. George Constantinesco, who utilised a system of propagating impulses through liquid on principles which through very simple are not easy to explain in brief terms. Generally it may be said that the idea is to take a column of water or other liquid, confine it in an unyielding pipe and at one end administer a rapid and regular succession of blows to the water by means of a reciprocating piston or plunger. In this way the water is compressed with the repeated blows of the piston and these compressions travel along the whole length of the pipe operating at the other end a second piston which works in unison with the movement of the first piston. There is no flow of water along the pipe: the vibratory movements are simply transmitted along the column of water. Valuable as this invention was when applied to machine guns on aeroplanes it is likely to be of even greater utility in the domain of industry. Recently it has been used in connection with rock drilling, the scheme of power transmission being availed of to operate rock drills which depend for their effective action upon the delivery of a

series of blows in rapid succession. Recently there was a demonstration of the working of invention in association with rock drills at the works of Messrs. W. H. Dorman and Co. of Stafford who are the licensees of the system. In this instance a hole 47½ inches deep was drilled in a block of Cornish granite in 13 minutes, the drill being operated by a generator which absorbed about 12 horse power. An Ingersoll compressed air drill which was put upon the same work took 15 minutes to complete the bore and this with the service of as much as 27 horse power at the air compressor. It is claimed that the wave power drill is so economical in working that if used in the Rand gold mines it would save as much as a half million pounds in the year. There seems to be a great future for the inoculation.

BRITISH TRADE WITH INDIA.

Mr. Thomas Ainscough's paper on British trade with India at the Society of Arts last week was a well considered and suggestive survey of the existing industrial and economic situation in India. An optimistic note ran through the speaker's references to the financial stringency which has followed upon the fall of exchange. The unsatisfactory conditions prevailing he regards only as temporary and he looks forward to a trade revival of an encouraging kind in the not distant future. Perhaps the most instructive part of the paper was that in which Mr. Ainscough dealt with India's industrial renaissance. He pointed out how during the last three years of the war India had enjoyed phenomenal prosperity culminating in the great industrial boom of last year. The inevitable tendency to over capitalization shown in the floating in the year ended March 31st last of 906 companies with an aggregate capital of £183,000,000, was touched upon. But Mr. Ainscough was not discouraged by this display of industrial independence which he regarded as a natural development of a situation in which special needs had been created. British shipments

the greatest scientific experts of the day in this particular line took part—the fact emerges that there is a wide and profitable field open for the extension of the existing sources of fuel supply. Apparently no great reliance is placed on the discovery of new petroleum oil fields though obviously there are immense possibilities in this direction in many parts of the world in which no surveys have been made or in which only imperfect investigations have been conducted. What the Conference mostly concerned itself with was the practicability of augmenting the petroleum supply by the manufacture of spirit from various natural products. In this respect power alcohol had the first claim to attention. The material from which alcohol can be distilled is of infinite variety and nowhere is it to be found in greater abundance than in the tropical regions of the Empire where climatic conditions favour cheap production. Sugar and rice straw were mentioned as suitable agencies for the manufacture of power alcohol and you in India do not need to be told that the coconut palm and the bastard date and mhowra flower are also available for spirit production. Probably there are other equally valuable sources of supply amongst tropical growths which at present have no great commercial value. The subject at all events is of transcendent importance in connection with the economic development of India and there should be hearty co-operation on your side with the efforts that are now being made here to create an alternative supply of motor fuel from outside the mineral oil field. If, as seems probable on the facts disclosed at the Conference, power alcohol has a great future as a motor spirit, there is room for a vast new industry in India—an industry which would stimulate agriculture and give lucrative employment to tens of thousands in the processes of manufacture.

Apart from power alcohol the experts are hoping to find what is needed to augment the petrol supply in products which at present

are not utilised as they might be for the purposes in view. Mention was made of Irish peat, but without any very great hopes of working the material successfully. The difficulty appears to lie in the absence of any efficient method of de-hydrating the material. If it were possible successfully to dry the peat by artificial means there would be in the Irish peat beds—a speaker at the conference asserted—sufficient deposits to produce 150 years supply of spirit, at the present rate of consumption, for the United Kingdom. It is, however, in the manipulation of raw coal that the best prospects of success are to be found. Benzol can be produced in enormous quantities from our existing supplies if we are prepared to change our methods and use coal as it should be used so as to yield this highly valuable by-product. As we were reminded at the Conference, some years since that distinguished scientist, Sir William Ramsay suggested that instead of mining coal with a great expenditure of labour, we should make the attempt to gasify the coal *in situ*. Assuming this process to be in operation we should have a series of bore holes made into the coal bed and gas produced by the right methods and drawn to the surface through other bore holes made for the purpose. The prospect of eliminating the miner altogether from the operations makes a special appeal at the present time when we are in the throes of one of the greatest—if not actually the greatest—coal strike in our history; but it is to be feared that the project is somewhat Utopian and that we shall have to rely upon more prosaic methods if we are to utilise our coal for benzol production. It was suggested, indeed, at the Conference by Professor W. A. Bone, that the idea of using coal to produce a vapour for power purposes is wrong and that we should be likely to obtain far better results if our experts concentrated upon the discovery of means by which compressed or solid fuel prepared from coal might be used for motor propulsion. He instanced lignite—

of which there are vast supplies in Canada and Australia—as a potential agent of great value, and recommended that the question of its use in the manner he proposed should be thoroughly investigated. From several points of view the Conference was of exceptional interest and importance and it should lead in the near future to developments which will aid to modify if not entirely to neutralise the effects of the petrol shortage.

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may he thinks fall off in certain directions as a consequence of these Indian developments, but the loss he believes will be more than made good by dealings in articles of a wider range and a superior class which India's prosperity has placed within the reach of her people. Moreover, the development will provide great scope for the operations of British financiers and industrialists. There is urgent need of directing force and ability, experience of modern and scientific conditions of industry and expert foreman and artisans to train available labour. "These," says Mr. Ainscough, "can only be provided from overseas, and it would appear that unless British financiers and manufacturers are prepared to seize the opportunities offering there is a risk that foreign interests may become established in the country." In harmony with these views Mr. Ainscough holds that India's aspirations for industrial independence are natural and legitimate and he reasonably warns British *entrepreneurs* to do nothing to alienate Indian sympathies. He advises British manufacturers who are intent on commencing operations in India to enlist the co-operation of Indian capital and wherever practicable to allow it representation on the board of directors as a means of securing that friendly association which is invaluable in dealing with many local problems. There was much in the paper to give food for thought to those who are concerned in the prosecution of British trade in the new era we have entered upon and Mr. Ainscough's observations should have a valuable effect in dissipating misconceptions and prejudices creating the right atmosphere in which to establish the relations of British and Indian trade under the changed conditions.

DEVELOPMENT OF COMMERCIAL AVIATIONS.

The future of commercial aviation is a fascinating study and it becomes the more fascinating the further we get from war conditions. At the recent air conference at the Guildhall many opinions were expressed

as to the lines upon which development of commercial aviation should proceed, but there was practical unanimity for the view that Great Britain had it in her power to secure supremacy in this sphere if she elected to make full and proper use of her resources. Emphasis was laid by more than one speaker of eminence in the aviation world upon the urgent necessity of developing the long lines of communication which run through the British Empire. The carriage of mails to India by air was especially insisted upon as the purest guarantee of the ultimate success of any world scheme. What India gained in the way of speedy communication, it was argued, Australia and New Zealand and the Far East would soon demand and the day would come when correspondence by letter with the most distant of centres in Australia and the East would be possible within a period measured by days where weeks are now occupied. Curiously enough some opposition was shown to the idea of Government subsidies. Forgetful of the fact that the Indian and Far Eastern mail service was originally built up on a subsidy to the P. and O. Company some speakers spoke of financial aid of this character as an undesirable innovation. It is probably that when a scheme of distant aerial mail communication is evolved it will be found to differ little in its main principles from the ocean mail system. Only by such means will it be possible to carry on a regular service in all seasons and during all weathers to say nothing of the financing of a venture sufficiently strong to outlive the almost inevitable losses of the preliminary period.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

The Hudson Tunnel for Vehicles.

Washington, D.C., U.S.A., Oct. 26, 1920.—

A red letter day in the history of the world's urban transportation was October 12, of this year, when the governor of the state of New Jersey and the governor of the state of New York broke ground inaugurating the construction of the much-planned-for vehicular tunnel beneath the Hudson River, the first great tunnel of its kind to be constructed in the world. Tunnels somewhat after this character have been built before, notably the Rotherhithe tunnel, London, and one beneath the Elbe at Hamburg. But these two, because of their shorter length, are not burdened with the great problem of artificial ventilation, which renders the construction of the great Hudson River tunnel so formidable an undertaking.

The twin-tube structure one and one-third miles from end to end, and the outer diameter of each tube will be 29 feet. The Rotherhithe tunnel has a span of 1,570 feet between the ventilating shafts, whereas there will be stretch of 3,900 feet beneath the tide and between the off-shore ventilating shafts. Of these last-named there will be four—two near the pierhead lines and two inshore, near the tunnel exits and entrances. A cross section of the tubes shows that they will be divided horizontally by two portions, the upper chamber being used for the outflow of the foul air, the lower chamber for the inflow of fresh air, and the middle chamber being devoted to traffic. The road-bed will be 20 feet wide, with a clearance of 13 feet, 6 inches between the floor level and the under side of the ceiling.

To ventilate the tubes there will be provided 65 electrically-driven fans which will be sufficient to effect a complete change of the air 32 times every hour. The operation

of the ventilating system at maximum capacity will call for the annual expenditure of \$280,000. The traffic is estimated for the first year at 119,000 horse-drawn vehicles and 2,686 motor vehicles, and in the tenth year the figures show a potential one-tube traffic of 68,000 horse-drawn as against 5,916,000 motor vehicles. Twenty years from the opening of the tunnel it is estimated that the dual route should be handling a total of 15,800,000 motor vehicles in the twelve month.

The cost of the tunnel is now put down at \$28,669,000, which will be divided equally between the two states. It is expected that, in eleven years, the operating revenue will have yielded sufficient income to amortize the cost of the tubes, and that at the end of twenty years each state will have to its credit a surplus of \$33,635,000, or sufficient to build another double-tube tunnel. In three and a half years the tubes should be open, and the intolerable congestion and delay of the present ferry service (which has never been adequate) will become a thing of the past.

HOME MOTION PICTURES IN DISK FORM.

It has remained for one of the American pioneer workers in the field of motion pictures and the inventor of one of the most successful processes of natural-color motion pictures, to introduce a simple motion picture apparatus for home and kindred uses. By replacing the usual film with flexible disks this inventor has simplified and reduced the cost of motion pictures to a point where they are available in almost every home.

The basis of the present system is a transparent disk on which the images are arranged in a continuous spiral. It has been found impractical to utilize a disk negative for photographing the subjects, hence the process makes use of standard positive motion-picture film which is projected in greatly reduced form into the master disk. Once this master disk, which is a negative, is obtained, it is possible to print any number

of positive disks for use in the projector. This reduction process requires most precise handling, and it was only after many years of careful, constant development that the present successful results were obtained.

The projector embodies the usual elements. It has an incandescent lamp, condenser, shutter, lens and an intermittent gear. The operation starts with the first image on the outer turn and follows the spiral to the innermost image. Obviously, the pictures do not have to be rewound, as with standard film.

The actual size of the images is $\frac{7}{8}$ of an inch by $\frac{5}{8}$ of an inch. The 11 inch disk contains 1,200 pictures, or the equivalent of 75 feet of film, exclusive of titles. Only two frames are devoted to titles, since the machine can readily be stopped when a title is reached, and then started up again, thus saving a great number of frames. In this manner the record may be said to equal the usual 100 foot run of film with titles. This matter of being able to stop the pictures at any point also aids in studying any given bit of action—something which is generally impossible with machines utilizing regular film.

By removing the lamp and substituting a small mirror the projector can be used by an individual for viewing a picture without going to the trouble of putting up a screen, darkening a room and making the necessary electric connections.

A MOBILE SHOE-REPAIR SHOP.

Two special trucks built by a well known Detroit, Michigan, manufacturer, and especially equipped for use by the United States army, as mobile shoe-repair shops, recently made a test trip from Boston, Mass., to Washington, D. C. The purpose was to show how easily such an outfit can be moved from place to place, what speed can be maintained, and how it will stand up under a 500 mile road trip.

The first truck carries all of the necessary machinery for remaking and repairing

shoes, which is driven by a separate motor connected with the driving shaft of the standard stitching machine, the nailer, the scouring and finishing wheels. This motor also furnishes electric lights through a dynamo, and heating facilities are provided through registers connected with the exhaust.

The second truck is equipped as a supply depot, and carries all of the materials for repairing soldiers' shoes, such as sole leather, heel lifts, hob nails, tacks, welting and other necessary findings as well as extra machine parts for both the trucks and machinery. This supply truck can also be used to dispatch repaired shoes to various points along the lines where troops are located. Army officers estimate that approximately 1,000 pairs of shoes a day can be tapped when the mobile outfit is running with a day and night crew of seven men. There is also carried a complete set of apparatus to pull the trucks out of snow drifts or mud, consisting of ground anchor, winches, ropes, chains, picks, and shovels.

8,000,000 Automobiles in Use in United STATES.

That the United States automobile industry's greatest future lies in future countries where people are realizing the advantages of motor vehicles for the transportation of passengers and freight, is the opinion unanimously held by the members of the National Automobile Chamber of Commerce. The importance of the foreign markets may be readily inferred from the fact that there is in the United States one car for every 14 inhabitants and throughout the world the ratio is one car for every 2,870 inhabitants.

This country is now using eight million motor vehicles, of which 850,000 are trucks, and, with production this year, about 2,000,000 motor vehicles.

The modern motor vehicles has already geared America to a new efficiency in commerce, provided a new standard of life and inaugurated a new philosophy of thought.

It must take the same position in other countries of the world, just as soon as the people fully appreciate its time-saving value.

Our exports of cars and trucks, which represented 8 per cent of the value of all completely manufactured United States products shipped abroad, amounted to 139,875 vehicles, valued at \$ 166,961,709; whereas those of all automotive products exceeded \$220,000,000 during the last twelve months. Automobiles are now being exported from the United States to more than 90 different countries of the world. Shipments of these are by no means limited to the older European countries. Uruguay and China have been better purchasers of cars than has France, while Argentina ranks higher than any of the older Scandinavian countries. The snows of Iceland and the Faroe Islands have not prevented their inhabitants from buying from the United States both motor trucks and passenger cars, whereas in the Belgian Congo the motor trucks and passenger automobiles imported from the United States last year are demonstrating the true value of motor vehicles as a means for opening up sections rich in tropical products and yielding immense returns.

The states of Iowa and Nebraska have a car for every six people; American farmers own 2,500,000 cars; 155,000 motor vehicles bring freight and passengers from the surrounding country to Manhattan Island (New York) every day. In fact, the power-driven vehicle has added so much to the productivity of America, and in so many and diverse ways, that other countries are hastening the day when they can use them in large numbers.

WOOD CHARCOAL and ITS MANUFACTURE.

The uses to which wood charcoal is put are numerous, chief among which may be mentioned its use as a source of cheap power for running gas suction engines, for smelting purposes and for smithy work. It is also used as a smokeless fuel and in the manufacture of ammunition.

Government scientists have made analyses of wood charcoal, the results of which are most interesting. On account of its porous nature and the very large internal surface it contains charcoal has the power of absorbing large amounts of gases. Similarly, charcoal, especially bone charcoal, prepared by heating bones, will absorb coloring matters from solutions, so that it finds a considerable application as a decolorizing and deodorizing agent. It is utilized also for insulating purposes, as it is a bad conductor of heat and electricity, and it is given to poultry in crushed form. The chief constituents of wood, say the investigators, are cellulose and lignin, both rich in the element carbon, and when wood is burned in the presence of air, light, heat and gases are produced, while ashes containing the mineral constituents of the wood form the residue. When heated to high temperatures without free admission of air most of its organic substances (lignin, cellulose, etc.) are decomposed and given off as gases, a residue of impure carbon remaining. This impure carbon residuum is called charcoal, and it consists almost entirely of the element carbon mixed with a certain amount of still undecomposed carbon compounds and the inorganic constituents of the wood chiefly in the form of potassium carbonate.

SOMETHING NEW IN GASOLINE-DRIVEN PLOWING MACHINES.

We are told that there is nothing new under the sun. In a broad sense this is probably true, but variation in the application of certain well-recognized principles frequently creates machines that may, without exaggeration, be properly classed as extremely original. Such is undoubtedly true of the plowing machine now in successful operation in this country.

What, at a distance, appears to become queer development of a flying machine, with its wings outstretched, resolves itself at closer range into an interesting but distinctive type of plowing machine.

To a person unfamiliar with mechanics the initial sight of such a machine is somewhat astounding, but keener observation, particularly when the plow is in motion, impresses one with the vast possibilities of such a unique machine.

The design of the machine is much out of the ordinary, and is a radical departure from the usual present day practice of tilling the soil. The designer of the machine has made several successful trials and all of its performances up to this time have more than met the fullest expectations of the inventor and builder as well as of others who are interested in its wonderful possibilities.

Unlike the ordinary plow, where the furrows are made parallel to the travels of the machine, the method of operation of this plow causes the plow shares to move at right angles to the forward movement of the tractor, resulting in a furrow that converges toward the center at an angle of about 20 degrees, leaving the plowed land with a herringbone appearance.

In operation, the plows travel toward the center of the machine, seven of the plows on each side being in the ground at the same time. The width of the land covered at one passage of the machine is approximately 40 feet.

When turning at the end of a field the two plow arms can be raised so that the plow shares and the disks are clear of the ground, and the machine can be turned in its own length by means of the steering wheel and the caterpillar tractors. When desired, a start can be made from the very end of a field, as the tractor can be backed up to a fence, if necessary. The machine, however, is intended mostly for plowing where large tracts of land are under cultivation.

The machine has an approximate weight of eight tons, and under tests on land that had been plowed in three or four years it covered about 32 acres in a day of 10 hours.

NEW USES FOR A RARE ELEMENT.

New and interesting uses for rare elements or metals seem to be demonstrated constantly. "Selenium" is not a familiar metal, but is a by-product in the electrolytic refining of copper. Demand for it has been very light and its chief use has been in the glass industry, in photographic chemistry and in medicine. It has also been used to a limited extent in electrical work, because it possesses the peculiar property of varying conductivity according to the intensity of the light. Under the influence of the light its conductivity may be 500 times greater than in the dark.

As the result of extensive research work carried out at the University of Wisconsin a new property has been discovered which should open up a big field for the application of selenium and incidentally make it worth while for copper refiners to pay more attention to its recovery. In the form of selenium oxychloride it acts as a powerful solvent on certain organic substances. The unsaturated hydro-carbons, such as acetylene, benzene and toluene dissolve readily, while the paraffin hydro-carbons, such as gasoline, vaseline and paraffin wax, are unaffected. Pure rubber, vulcanized rubber, asphalt, bitumen, and the casein glue used in airplane construction dissolve easily in selenium oxychloride, and it can be used in coal analyses to extract the bituminous material in soft coals.

ALFRED T. MARKS.

NOTES.

The following Note has been issued by the Madras Publicity Bureau:—The Government have approved the proposal of the Chief Conservator of Forests to establish a Saw Mill at Russelkonda in the Ganjam District to deal with timber extracted from the Government forests in the locality. The detailed management of the working of the mill and the marketing of the produce will be entrusted to Messrs. Parry & Company in accordance with the terms of a five year agreement which is terminable on six months notice by either party. The general policy of the undertaking will be controlled by a joint board consisting of 2 members nominated by Messrs. Parry & Company and 3 representatives nominated by the Government who will be for the present (1) the Chief Conservator of Forests, (2) the Forest Utilization Officer, and (3) the Conservator of Forests, Northern Circle. Experience has shown that the forest resources of Ganjam can only be fully utilised if mechanical sawing is substituted for the slow and wasteful process of hand sawing. The mixed lot of forest timbers available do not command any ready sale at remunerative prices when dealt with by the customary rough and wasteful methods. The success of a steam saw mill in converting the various sorts and sizes of timber to hand into a marketable product will depend almost entirely on the proper use of up-to-date and elaborate machinery which can be operated only by experts in saw-mill practice. It was for this reason that the Forest Department decided to invite the co-operation of Messrs. Parry & Company as this firm has the largest saw-mill experience in South India and possesses in the person of Mr. Brace Brooks one of the first experts in India in milling and marketing timber. Mr. Brace Brooks is now engaged in studying the latest saw-mill practice in America

and Europe where there have been great developments in the timber industry since the war. He is to purchase the machinery required for the Russelkonda mill. It is expected that the mill will meet some part of the present very large and unsatisfied demand in the North of the Presidency for timber sawn to definite dimensions and effectively seasoned. It is also hoped that private enterprise may be induced to consider seriously the possibility of setting up similar plants in other parts of the Presidency if the use of a well equipped and modern saw-mill proves a commercial success in Ganjam.

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It has long been known that American and German steel makers were anxious to find some openings by which it would be possible for them to work not exactly in co-operation, but at any rate in close co-ordination, and it is now over a year since the U. S. Steel Trades combine made their first overtures to German iron and steel masters. Something very like a steel combine has now been formed, in which not only U.S. and German, but also French firms are represented. The only conspicuous absentees are the British steel makers; and whilst they are to be congratulated on their sturdy independence, it is evident that more than mere admiration of their attitude will have to be forthcoming if we are to help them face the fierce competition they will have to meet. Some time ago, under the old International Steel Rail arrangement between the producers in various countries our trade received a setback from which it was exceedingly difficult to recover in spite of the superior quality of our productions, the vast size of our Colonial and Indian markets, the tremendous amount of capital we had invested in foreign undertakings, and other advantages. At present we are suffering from a shortage of rail mills, and it would seem that at any cost that deficiency must be overcome. The far-sightedness of our steel firms in keeping aloof from the new International Combine is to be

commended, and their efforts should be assisted in every way possible by all interested in British trade development. From every point of view our people are likely to do better fighting than assisting the combine, and British industry should certainly be the gainer by this attitude of sturdy independence.

The Spruce Falls Company, Limited, Canada has acquired 23,727 acres of pulpwood limits in Northern Ontario, 1,740 square miles, 400 acres of a colony farm occupied by a aliens interned during the war, at Kapuskasing and water-power rights on the Kapuskasing, River. The company has authorised capital of 7,000,000 dols., and its purchases of equipment, etc., are likely to be made largely in the United States and Canada, although through the efforts of H.M. Trade Commissioner's Office at Toronto, United Kingdom makers of pulp and paper machinery, have had an opportunity of submitting quotations and particulars to the legal representatives in Toronto of the Spruce Falls Company.

The Premier of Ontario has announced that in future in all contracts for the sale of pulpwood limits a clause will be inserted guaranteeing 15 per cent of the output to Canadian newspaper publishers.

According to the Canadian Pulp and Paper Association, the pulp and paper exports from Canada for April reached a total value of 8,172,356 dols, as compared with 4,968,939 dols. for April, 1919, an increase of 3,203,417 dols. They were made up as follows:—

	1919.	1920.
Month of April.	Dols.	Dols.
Paper and manufacturers of	3,630,238	4,729,354
Chemical pulp...	1,120,990	2,936,633
Mechanical pulp	217,711	506,369
Total ...	4,968,939	8,172,356

Newsprint formed the principal item of the paper exports for the month. There was, however, a falling off in quantity at 899,324 cwt., although an increase in value at

3,827,541 dols., as compared with 920,592 cwt., valued at 3,160,318 dols., in April, 1919.

Lack of pasturage for dairy cattle in the vicinity of Nitro, West Virginia, resulted in the establishment at that war-built city of a "machanical dairy," where milk and cream equivalent to the output of a farm with 1,500 milk cows, were produced, according to a Government report recently published. Bottles and cans of the fluid were labelled "reconstructed" milk or cream and "nitro-leo." Accommodation for 25,000 inhabitants had been provided at Nitro—schools, churches, hospitals, department stores, restaurants and all other elements of a modern well equipped community being part of the project. As a construction problem it was comparatively simple, but officials began to meet with obstacles as soon as they approached the task of ensuring a supply of staple foodstuffs, particularly of fresh milk. Nitro is situated in a mountainous district where little, if any, natural pasturage is available. Local milk supplies were barely sufficient to satisfy the normal demands of Charlestown, the nearest metropolis. Expansion of the natural supply being out of the question, the public health service was asked for aid, and the first "mechanical dairy" resulted. The process used is described as the "emulsification of butter fat obtained from unsalted butter in a solution of skimmed milk powder or diluted evaporated milk." A building, 150 feet long by 51 feet wide was constructed and provided with huge mixing vats, refrigerators and bottling apparatus. Chemically pure water was used in the mixing and careful tests were made of the product, which proved to be a little superior, if anything, to natural milk.

In Japan a new fibre has been coming into use, known as "sugamo," a kind of sea grass which, when properly treated and mixed with raw cotton, makes a yarn strong and useful for cheapening the manufacture of cotton

fabric, the price of which, it is said, is now very high. It is hoped that if the new material could be brought into general use for the cheaper makes of cotton the price of clothing for the poor will be reduced. This sea grass grows plentifully along the shores of Japan the quantity indeed being unlimited. It is harvested usually in the autumn months. Its utilization for mixing with raw cotton has only just begun, so that developments are problematical. The main difficulty has been to invent successful means of removing the tough outer skin of the plant so as to set free the fibre; but improvements in the process are very promising. The plant has to be boiled in lye and then rinsed repeatedly in water until all the hard outer skin is removed when the fibre left is not unlike cotton. The work of preparing the fibre forms a profitable occupation. It is said that cotton mixed with this sea fibre is stronger and more durable than unmixed cotton, tests on sea nets made from it having proved very satisfactory. It also takes dye well and has rather a pleasing gloss when finished. A company has recently been formed in Japan for exploitation of the new enterprise, and great developments are expected. Mixed with pulp it improves the quality of the paper turned out, and it may also be usefully employed in other important industry.

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The following Press Communique of the Government of India, Public works Department (Establishment), dated Simla, the 1st November 1920, is republished:—The Government of India have learnt from the Secretary of State that during the present year there has been a large influx of Indian students to Great Britain, desiring to pursue courses of instruction and training in Engineering without having acquired preliminary education in India sufficient to enable them to enter upon Engineering studies in that country with profit to themselves. Apart from the fact that Engineering Colleges and Engineering Faculties in England are at

present overcrowded, these students are exposed to disappointment by being unable to obtain admission on account of their previous inadequate training, no Engineering College or University in Great Britain being willing to admit an Indian student of Engineering on the ground that he has passed the matriculation or Entrance Examination of an Indian University. The Government of India, therefore, desire to warn all students intending to proceed to Great Britain who are desirous of pursuing courses of instruction in Engineering, that they are acting to their own disadvantage if they leave Indian University or, better still the B.Sc. or the B.Eng., and that, in order to avoid disappointment, they should, before leaving this country, invariably consult and act on the advice of one of the Students' Advisory Committees which have been formed at Madras, Bombay, Calcutta, Dacca, Allahabad, Lahore, Patna, Nagpur, Gauhati, and Delhi.

.. ..

Thrift is not a hard practicality alone; there may be rich romance in it, says the *Canadian Textile Journal*. Rubbish, waste, useless stuff that men threw away and paid to have carted off to the dump was the basis of one of the greatest fortunes in England and the stepping stone to a peerage. An Englishman who died the other day had a career which was one of the most remarkable romances the world of invention and manufacture has ever known. As a young man he was a spinner in Yorkshire, had mastered his trade and owned some mills. One day, when in London, he came across a heap of silk waste mixed up with dirty rope ends, leaves and sticks, all knotted together. "What is that?" he asked. "Oh, simply rubbish. It is impossible to do anything with it," was the reply. But the trained young spinner of Yorkshire knew better. He bought the great heap of waste at a half penny a pound and was laughed at. For nearly ten years all the profit from his mills went into experimental machinery for the utilization of this

waste. Then came the startling announcement that he had produced a machine which, at small cost, turned the waste rubbish into beautiful fabrics. The result is that to-day waste silk pours into the great Manningham mills from all parts of the world, to come forth worth hundreds of thousands of pounds.

The National Aniline and Chemical Company is rapidly adding to its line of colors urgently needed by the textile trade, says *Textiles*. Among the most recent additions is Superchrome Garnet Y, which is a chrome dyestuff notable for its level dyeing as well as its fastness qualities, and is an adequate substitute for the pre-war Acid Alizarine Grenade R of Hoechst. It can be applied by the top, meta or bottom chrome methods, although the top chrome method gives the best results from the point of view of fastness. It is especially recommended where the fabric requirements call for exceptional fastness to decatizing, fulling, light, potting, and washing in the production of browns, Bordeaux and mode shades on woollens and worsteds. It can also be employed for vigoreaux printing with chromium fluoride, acetate of chrome or chromium salts. Another very desirable addition is Fast Crimson G. R, a level dyeing Acid Red, corresponding to the pre-war types Amido Naphthol Red G. and Azo Phloxin 2G. This color is unusually fast to light and will leave cotton and silk effects unstained. One of the new browns added is Alizarol Brown 2 R, which is a chrome color matching the pre-war types Acid Alizarol Brown B, Palatine Chrome Brown W and Anthracyl Chrome Brown D. This is a top chrome dye possessing good fastness to fulling, carbonizing and light, and is especially suitable for light fancy shades on high-class woollens and worsteds.

The following note has been received from the Secretary, Sugar Bureau.—In South Africa pioneer work has been done in the production of motor fuel known as natalite

by distillation of the molasses from the sugarcane. It is by no means a perfect fuel for internal combustion engines and the difficulty so far has been to discover a powerful denaturant that is both cheap and plentiful. In 1919 the Advisory Board of Industry and Science recommended that the manufacturers of natalite should be given permission to manufacture a certain quantity of the spirit, using one per cent of pyridine as a substitute for the costly wood naphtha then used. But this recommendation was not accepted. It is now reported from South Africa that in recent months a new denaturant has been found in a petroleum product known as simonsen and that the authorities have permitted its use in the place of wood naphtha. It is stated that this product is very efficacious and its presence with pyridine in industrial alcohol fully meets the desired end. In view of the urgent need for the production in large quantities of cheap motor spirit, this discovery is of considerable interest.

The Government of India decided in May last to establish a Labour Bureau under the Board of Industries and Munitions, and the Bureau has now been in existence for some months. Mr. A. G. Clow, I.C.S., is Controller of the Bureau and Miss G. M. Broughton, O.B.E., I.E.S., who has returned from work in the Welfare Department of the Ministry of Munitions and was connected with the Industrial Fatigue Research Board in England, has been appointed Lady Adviser. The main functions of the Bureau will be the collection and collation of all information bearing on labour in India. It will maintain contact with the International Labour Office at Geneva and with similar institutions abroad, and should as it develops serve as a centre of reference for all interested in Labour questions and for officers of Government and private persons who have to deal with industrial labour. The Lady Adviser will by touring throughout India collect

information bearing on women's and children's labour and her advice and help will be at the disposal of all who care to avail themselves of it.

As cotton is grown over large areas in India what the "Popular Science Monthly" says of a new use of cotton stalks ought to enable Indian capitalists to make money. It says:—"There is now a pulp-mill in Greenwood, Mississippi, that turns one hundred and fifty tons of cotton stalk into fifty tons of valuable paper pulp every day. A careful study of the cotton plant has led to the discovery that a certain thin tubular fibre in the plant will make excellent cellulose for durable papers. It is strong and flexible. If a quarter of the annual supply of the cotton stalks of the South were put to this use each year there would be no need of a paper shortage in this country." The same journal tells its readers that the bark of eucalyptus trees can be used for making twine, rope, and bagging. The bark is first passed through a softening machine which loosens the fibres. Next it is put through carding and spinning machines. The resulting twine is strong, durable, and does not cost much to manufacture. The supply of bark is practically unlimited and can be easily gathered and sent to the factory. The eucalyptus tree grows in India, too.

In connection with the establishment of a sericulture farm at Kalimpong it is understood that this place was selected last year by Mr. Evans, Director of Agriculture, Bengal, and Mr. Jameson, Imperial Protozoologist. Besides the land set apart for the cultivation of the mulberry two plots have been acquired for a laboratory. Sericulture was first started at Kalimpong over six years ago in connection with nature study in the classes of the local Training School and the operations have all along been directed by Mr. P. C. Chaudhuri, Superintendent of Sericultural Research, Berhampore, Bengal.

The silk worm that has proved suitable for this place is the multivoltine species which is also largely reared in Japan and other countries because of the larger yield of silk that it gives in comparison with the other species. Kalimpong has proved better suited for sericulture than Shillong, because of its colder climate in the winter and its proximity to railway communication.

Mr. L. G. Killby has been appointed Secretary to the Empire Cotton Growing Committee. He is at present Superintendent of the Department of Technology, City and Guilds of London Institute. In 1904, at Oxford, he took his B.A. degree in the Honours School of Natural Science, with First-Class Honours in Chemistry. He then became Demonstrator in Chemistry, and in 1907 was awarded the degree of B.Sc. (Oxon) for research work. He has been on the staff of the Department of Technology for 14 years. During the war Mr. Killby received a Commission in the Army, and served in France as one of the chemists on water supplies in the field, and was afterwards transferred to the Chemical Warfare Department of the Ministry of Munitions. He was mentioned in despatches.

The enormous sales of machinery and stores of all sorts at the munitions works in England offer unusual opportunities to Indian dealers and users of machine tools of all sorts. Some recent issues of the *Machinery Market* contain as many as six pages of advertisements of sales by auction of every description of machine tool for working in wood and metals hydraulic plant, contractor's plant, electric plant, lifting and hoisting plant, gas producers, prime movers, appliances for heat treatment, grinding machinery, drawing and piercing presses, telephone installations, testing machines, power hammers, shearing and sheet metal working machinery and other appliances, many of which have done very little service. At a time when new machines are so difficult to obtain without long periods of waiting, this occasion should be welcome to many manufacturers who are in need of renewals or extensions of plant.

GLEANINGS.

The grand total of gross Indian sea and land customs revenue (excluding salt revenue) collected during the six months, April to September, 1920, amounted to Rs. 1,530 lakhs, as compared with Rs. 885 lakhs in the corresponding period of last year. Import duties contributed Rs. 1,099 lakhs; export duties Rs. 238 lakhs; excise duties on cotton manufactures Rs. 138 lakhs; and on motor spirit Rs. 26 lakhs; and land customs and miscellaneous Rs. 29 lakhs. Cotton manufactures, metals and hardware, liquors and tobacco were mainly responsible for the increase.

Chinese methods of producing silks are so primitive that it will be a long time before China can offer satisfactory material to the American market, writes Mr. D. E. Douty, one of the American party who visited China to investigate the silk industry. The American silk dealers have often called the attention of the Chinese authorities to the importance of improving their silk industry, but the latter could never afford to listen to any suggestions on the subject. It is a matter of regret, says Mr. Douty, that China should remain in such a condition of industrial torpor at this time, when there is a growing international demand for silk.

Apropos of a paper mill for Mysore, others are doing while we are talking. Southern Saskatchewan is being surveyed with a view to securing the most suitable scope for a million dollar paper mill. Wheat straw is the material proposed to be utilised in the manufacture of paper. Experiments, it is said, have shown that two tons of straw can be made into a ton of paper, while two tons of coal are necessary for the power, making, it is stated, the manufactured product much cheaper than the price now charged for the pulp-wood product.

The Madras Government have granted Messrs. Tata Sons, Limited, Bombay, a concession of the right to make use of the water in the Kurdu river and its tributaries on the Nilgiris for the purpose of generating power for supplying electrical energy to

Ootacamund, Coonoor, Coimbatore and to the Cantonment of Wellington. The grantees of the concession have undertaken to pay to the Government of Madras within 2½ years a sum of Rupees 6 lakhs to be used for the Coimbatore water works and for no other purpose.

By the decision of an extraordinary meeting of shareholders, the firm of Messrs. Brunner, Mond and Company, Limited, is to devote £100,000 to the encouragement of scientific education and research. The resolution authorises the directors to distribute the sum to such universities or other scientific institutions in the United Kingdom as they may select for the furtherance of scientific education and research.

Experiments are being conducted at the Textile Institute at Leeds, England, in manufacturing, by a chemical process, artificial wool from cellulose derived from cotton waste. These efforts are said to have been very successful, and although the product is only a substitute for wool, it is said to have great wearing possibilities, especially if used with other fabrics.

On August 10, the Canadian Wheat Board made an initial distribution of over \$25,000,000 on account of participation certificates. These represent the difference between the fixed sum per bushel already advanced to farmers and the actual sum obtained after marketing operations have been completed. A further distribution will be made shortly.

During the first four months of 1920, 564 new industrial concerns came into existence in British Columbia, establishing a record for any similar period in the history of the Province. His Majesty's Trade Commissioner in Winnipeg says that the present year will be one of the heaviest in industrial development the Province has ever known.

The Madras Government have sanctioned the proposal of the Registrar of Co-operative Societies to raise the maximum rate of interest to be charged on current accounts in Co-operative Credit Societies from 2½ to 3 percent per annum. This order will be

much appreciated by co-operators in view of the decreased value of money.

The Federation of British Industries Commissioner in East Africa reports that the Government flax grader who recently arrived from Ireland is very pleased with the appearance of the flax produced in the Kenya Colony, and states that it compares very favourably with that grown in other countries.

During the first six months of the current year South Africa's imports were valued at £48,000,000, against £28,250,000 in the first half of 1919. Exports were valued at £51,000,000, compared with £58,250,000. It will be observed that the favourable balance has declined from £30,000,000 to £3,000,000.

A Hamburg scientist named Plouson, says the *Daily Express*, proposes to obtain a cheap supply of energy from the air by sending up metal balloons to collect electricity; he hopes to supply all Germany with electric power. He will use extra-high (pressure) overhead mains to enable the electricity to step down.

Losovski, the leader of the Bolshevik Trade Commission at present in Germany, has stated that the close co-operation of German and Russian trade unions is urgently necessary, and that Soviet Russia specially requires technical men for machine construction, electro-technics, and agriculture.

In order to attract tourists to British Honduras a motion is to be introduced in the Legislative Council that the Government should offer for 75 years at a "peppercorn" rent a site at Belize for the erection of a hotel within the next 12 months on plans to be approved by the Governor-in-Council.

Timely measures have been taken in Palestine to prevent the country from being disfigured by unsightly advertisements, and the erection of private hoardings in any

place except the actual premises in which the business is carried on has been prohibited.

An Extraordinary International Trade Union Congress is to meet in Brussels on November 23 to deal with the International distribution of coal and raw material, the work of the League of Nations for the reconstruction of Europe being considered too slow.

According to the *Monthly Commercial Letter* issued by the Canadian Bank of Commerce at Toronto in August, manufacturers in many centres report improved efficiency on the part of labour, indicating a trend in the direction of more normal conditions.

The situation in the flax industry in Belgium is growing more critical, and the cessation of orders due to the falling tendency in prices had led to the closing of the greater part of the works. There is no prospect of an improvement in the situation.

Sites for the erection of oil tanks at Melbourne, Sydney, and Freemantle, have been purchased, and as soon as the work is completed, the principal steamship lines trading with Australia will use oil fuel instead of coal.

Brazilian coal is declared by a New York expert to be of the finest quality, examination showing each ton to contain 30 per cent stone, 8 per cent ash, 10 per cent volatile substances, 201 pints of oil, 22lb. of sulphate of ammonia, and 110 lb. of iron pyrites.

A French Scientist attests that he has devised means of identifying timber by the various reactions on colouring matter it contains and that the idea can be extended so as to prevent deception in imported woods.

Owing to the present gloomy conditions in regard to cereal stocks in Germany, says

the President of the Imperial Grain Department, it is intended to import 2 000,000 tons of breadstuffs, chiefly from America.

It is officially estimated that this year's Canadian wheat crop will reach 298,000,000 bushels—an increase of 105,000,000 over the 1919 crop. The oat crop, it is thought, will amount to 556,000,000 bushels.

Sir Alexander Magnire, chairman of a British amalgamation, announces that British match manufacturers will invest £1,000,000 in an extensive plant in the Province of Quebec.

Japanese foreign and home officials are said to be considering a plan to direct Japanese emigration to Brazil in view of the barriers raised in Canada, the United States, and Australasia.

A Swedish Government Commission has reported in favour of the introduction of prohibition if the approval of 60 per cent of the voters is obtained in a referendum.

New South Wales Government dockyards at Walsh Island have contracted to build for the Sydney Ferries, Limited, two harbour steamers at a cost of £110,000.

A Bill to substitute a simple majority for the three-fifths vote required to enforce prohibition in Victoria was defeated by 34 votes to 24.

Moscow states that in the Smoleńsk Government 180,000 men and 190,000 horses have been registered with a view to labour conscription.

Two new fuel oil storage tanks, of 8,000 tons capacity each, are in course of erection at Perim and Aden, and will be completed within the next six months.

Japan is building a number of submarines, and, pending the construction of a special building, the subsubmarine school is using the battleship *Shikishima*.

Ontario will be able to absorb 50,000 farm workers next spring, and there is a demand for settlers both with and without capital.

Tirol peasants at Innsbruck have resolved that only immediate union with Germany can save Austria from collapse.

Northern Ontario has, during the last 10 years, produced £16,000,000 approximately worth of gold.

Japanese and Chinese companies with substantial capital are encouraging sheep and cattle rearing in the Mongolian prairies.

The United States received 992,850 lb. of the citronella oil exported from Ceylon in 1919, compared with 407,351 lb. in 1918.

Canada's production of condensed milk increased from 15,000,000 lb. in 1910 to 110,000,000 lb. in 1919.

£4,440,000 in Ontario and 3,478,000 in Quebec is to be spent on the improvement of roads and highways.

The Barbados Legislature is being asked to vote £50,000 for railway improvements.

It is announced that the Japanese are busily developing the Sakhalin oilfields.

Czecho-Slovakia has concluded a commercial agreement with Bulgaria.

New South Wales has 33,465,584 sheep, 2,852,046 cattle, and 577,183 horses.

Canada's total elevator capacity is now 226,000,000 bushels.

There are 3 per cent saw mills in operation on the Pacific Coast of Canada.

ECONOMIC NOTES.

INDUSTRIES AND COMMERCE.

Progress in the United Provinces.

The following Resolution of the Local Government on the Report of the Director of Industries, United Provinces, for 1919-20 is published in the *United Provinces Gazette* of 16th October, 1920:—

The report of the Director of Industries for the year 1919-20 reflects the influence of post-war conditions on industry. Development has been retarded by the difficulty of obtaining machinery and the restriction of the coal-supply occasioned by the shortage of wagons. Owing to labour troubles in England and the unsettled state of Europe, competition has not yet begun to make itself effectively felt, but the cessation of demands for the Army has restricted the market for goods of local manufacture. Capital is no longer shy of industrial investments, although its flow is in the main directed to the more advanced industrial centres. The glut of supplies in Europe and America has temporarily reduced the export of hides and reduced the price of this commodity almost to the pre-war level. Indigenous woollen goods still find a remunerative market owing principally to the high price of imported goods and up-to-date cotton mills have had more orders than they could deal with.

The glass industry continued to make headway. The Western India Prospecting Syndicate is constructing a factory near Firozabad, where it is proposed to manufacture sheet-glass as well as bottles and bangles. The need of the moment, however, is the introduction of more up-to-date furnaces and methods of manufacture. There is a plentiful supply of raw material and the results achieved by chemical research with *reh* justify the expectation that the sources of supply may be increased. But the call for initiative in this trade is urgent as foreign competition is beginning to assert itself as may be gathered from the figures of import for the year which have increased by Rs. 75,20,000. Government is obtaining the services of a glass expert to advise industrialists both in the matter of machinery and processes of manufacture: he is expected to arrive this autumn.

The future of the oil industry continues to be full of promise. The demand for oils as a substitute for fat in the manufacture of soap is growing. Experiments made by the Industrial Chemist to Government

show that when mixed in the right proportion with other ingredients *neem* oil loses its strong odour and can be solidified. The raw material for the manufacture of this oil is plentiful and there is therefore a prospect of a new, cheap, and useful ingredient in the manufacture of soap being placed on the market. Other experiments conducted in the laboratory of the Industrial Chemist would seem to indicate the possibility of cotton being utilized as a suitable base for the manufacture of vegetable butter. The growing scarcity of *ghee* is likely to increase the demand for, and popularize the consumption of, substitutes, the use of which is not open to objection on religious grounds; purely vegetable preparations probably fulfil this condition. The manufacture of casein also from cotton seed on a commercial scale would seem to deserve the attention of industrialists.

The essential oils industry of which Kanauj is the stronghold also enjoyed a prosperous year. Some time ago Government sanctioned an annual grant of Rs. 5,500 for three years to carry out experiments with a view to improve the indigenous processes of manufacture and this assistance has been of substantial help to the industry. An improved type of still has been introduced and experiments have been carried out in the distillation of roses. The results achieved were only fairly satisfactory, and the Industrial Chemist is of opinion that a higher percentage of the essence cannot be obtained without some improvement in the flower itself. Experiments were also carried out with clove-stems and these show that with an improved type of still the stems can yield on an average an outturn of 4½ per cent., the oil on analysis revealing a high eugenol content. These results would seem to justify the conclusion that although clove-stems are not an indigenous product their distillation could be undertaken in India if a cheap supply of the raw material from Africa or elsewhere could be organized.

During the war the hand-weaving industry received a strong stimulus from the difficulty met in obtaining manufactured articles from abroad. But with the resuscitation of foreign competition special efforts will have to be made for this industry to maintain its position in the market. The efforts of the Central Weaving Institute, Benares, and the other local weaving schools, fixed or peripatetic, have helped to popularize the fly-shuttle loom among weavers and the organization of depots on a co-operative basis for the supply of yarn and machinery should help to stabilize this cottage industry.

Mr. Heard's deputation to England early in 1920 to participate in the British Industries Fair in London has had excellent results. The success of the Indian section at this exhibition was reported as entirely due to the articles sent from this province and orders for

more than £1,000 in value were registered. Textiles could not be exhibited at the Crystal Palace Fair, but an application is being made this year to secure space at Glasgow for the exhibition of this class of goods also. It is believed that regular participation in this fair should help to establish a regular business connection with England and to popularize the art-ware of the province in Europe. The principal difficulty would seem to lie in the organization of the local market for the supply of goods up to sample in large quantities. This is the function of private enterprise, but the Principal of the School is giving all possible assistance. With an effective organization the future of this nascent trade with Europe should be assured.

The Technical Schools at Lucknow and Gorakhpur had a satisfactory year. There were 157 students undergoing training in the former and 178 in the latter including men attending night classes. Most of the successful students after completing their course are apprenticed with the railway workshops, while others find remunerative employment outside without difficulty. The Technical School at Jhansi, which was only recently established, has 59 students on the rolls. The Carpentry School, Allahabad, is rapidly developing as may be gathered from the following figures of enrolment:—

30th June, 1919	..	..	54
31st March, 1920	..	..	72

The training imparted at this institution is in great demand and should in course of time help to establish a prosperous trade in furniture and other woodwork in Allahabad.

Arrangements are already in train for a very considerable expansion of this institution.

The School of Printing and Dying at Cawnpore continues to attract students from all parts of India. A Printing School is also being temporarily established at Farrukhabad to train printers, the number of whom has diminished during the war owing to the older artisans having sought other employment during the period of trade depression. The organization of peripatetic instruction in dyeing is also under consideration. There were 115 students undergoing training at the School of Arts and Crafts, Lucknow. There is no lack of applicants for admission, but difficulty is experienced in inducing students to complete their course, as ordinarily a good many of them leave the institution in response to offers of employment, the demand for such craftsmen being very great.

Mr. Ormerod, the Principal of the Weaving Institute, Benares, was placed on special duty in December, 1919, to investigate the possibilities of

peripatetic weaving schools and to suggest method of widening the scope of their activities. His report has been received and is under the consideration of Government.

The weaving schools, both fixed and mobile, seem to have established their utility both as sources of instruction and as depots for the supply of improved apparatus. There are now 150 weavers working with fly-shuttle looms in Shahjahanpur, 225 in Moradabad, 90 in Etawah, and 1,500 in Mau.

There were 45 students in the Leather Working School, Cawnpore, on the 31st March, 1920. A branch school has also been established at Meerut and is at present under the administrative control of the Principal of the Cawnpore School.

Reference has already been made to the results of the more important experiments carried out in the laboratory of the Industrial Chemist at Cawnpore. By the appointment of Dr. Watson, a distinguished chemist, as the first Principal of the Research Institute, an important step has also been taken towards the realization of a scheme which the War had postponed. The Government Architect is preparing plans for the buildings and material is also being collected by the Public Works Department to start construction as soon as the plans are ready. It is hoped that this institute will be ready before long to play its part in the industrial development of the province. The question of adding a teaching side to it will be examined by the Committee which the Government is appointing for the purpose.

Sir Harcourt Butler desires to thank the Board of Industries for its valuable assistance in connection with the schemes which were submitted to it for advice. The Board is Government's principal adviser in all matters of industrial policy and with the expansion of the activities of the department its utility is destined to grow. His Honour also greatly appreciates the services of the Director, Mr. O'Malley, and his lieutenants.

FINANCE.

Economic Effects of the War.

Dr. J. H. Clapham of Cambridge, who addressed the Economic Section of the British Association on the economic consequences of the war, said it was as yet too early to work out a parallel between the commercial and industrial slump which followed previous wars and the slump that followed the Great War of 1914-18, for we had not yet had it.

"But," said Dr. Clapham, "it is coming. More certainly, I am inclined to believe, in the United States than in England; but pretty certainly here also. I say more certainly in the United States because her position bears most resemblance to that of England in 1815-17. Consider that position. What before the war was, on the balance, a debtor country has become a creditor country. That creditor is equipped to export both raw materials and manufactures—iron and steel goods particularly—on a huge scale. It is true she is a heavy importer of some foods, such as sugar, coffee and tea, and of certain raw materials, such as rubber, timber and wool. But owing to her tariff system and her general policy, she is reluctant to take many things which her debtors have to offer. Her recent 'dry' policy for example, has shut her markets to one of France's most valuable exports, an export with which France has always been in the habit of paying her creditors.

"Already, I notice, American business men are beginning to point out what English business men stated clearly in a famous document, the Petition of the London Merchants, a century ago—that the country which will not buy neither shall it sell. This was the most solid of all Free Trade arguments in the early nineteenth century, and it has lost none of its force. No doubt America is, and will be, glad to take part payment in gold, just as England was in 1814-16. But that is not a permanent solution. If she remains a creditor nation—and there is no present reason to think that she will not—she must in time arrange to take more goods from outside. Her political processes, however, are slow; and it seems unlikely that she will have adjusted her policy before the post-war slump is upon her.

OUR BETTER POSITION.

"The United Kingdom, which, on the whole, still takes freely what its customers have to offer it, is in a better position, provided its customers can go on offering. This may prove an important proviso.

Customers who have been little hurt or even helped by the war—Spain, perhaps, or Egypt, or India, or New Zealand—should continue good buyers. But the uncertainty gives cause for anxious thought in the case of the war-damaged nations, Allied and enemy. Modern financial and commercial organization has postponed the critical moment in a way that was impossible a century ago.

"Every kind of financial device—long private credit, assistance from banks, credits given by Governments—has been called in, so that trade may be resumed before the war-damaged nations are in a position to pay for what they need by exporting the produce of their own labour. The more industrial the damaged nation is, the more complex is the restarting of her economic activity. Corn grows in nine months, and pigs breed fast. The start once given, countries like Denmark and Serbia, both of which are normally great exporters of pigs or bacon, could soon pay for necessary imports of machinery or fertilisers bought on long credit to restart their rural industries. The United Kingdom, the least damaged of all the combatants except America, is believed by the Chancellor of the Exchequer to be now rather more than paying its way. That may be sanguine, but at the worst our accounts are nearly balanced. What might not have happened in 1919 if modern methods for postponing payment had not been applied internationally?

"The other chief combatants are far from paying their way. Italy is importing abnormal quantities of food and also her necessary raw materials with the aid of American and English credits, while Germany, who can get little in the way of credit, has hardly begun even to import the raw materials to make the goods by the export of which she may eventually pay her way, not to mention her indemnities.

THE CENTRAL PROBLEM.

"The central problem is one which I can only indicate here, not discuss. Its discussion is for experts with full inside knowledge from month to month, and the answer varies for every country. It is—when will the inability of the war-damaged nations to pay for all that they want, in food and materials, in order to restart full economic activity, make itself felt by the nations who are supplying them, primarily, that is, the United States and ourselves? In 1814-16, when the problem was of course infinitely smaller because nations were so much more self-sufficing, the reaction came at once for lack of long organized credits. Conceivably, all other combatants might do in turn what we seem to have done—that is, adjust their trade balance within a reasonable period and so avoid renewal of special credits. In that case the post-war trade slump would come, not as an international crisis, but as a gradual

decline, when the first abnormal demand for goods of all kinds to replenish stocks is over. Already this type of demand is slackening in certain quarters. We shall do very well if we have nothing worse than that gradual decline, which would be eased, in our case by our extensive connections with undamaged countries and by our willingness to buy most things which any nation has to offer. The situation would be still further eased if countries such as Germany and Russia were to develop in turn what might be called a reconstruction demand, to take the place of the satisfied reconstruction demands of our allies. But the fear, as I think the quite reasonable fear, expressed in some well-informed quarters, is that, in view of the complicated and dangerous currency position in many countries; in view of the difficulty which the war damaged nations have in collecting taxes enough to meet their obligations; in view of the slowness with which some of them are raising production to the level of consumption; in view of the complete uncertainty of the political and economic future in much of Central and Eastern Europe—that in view of these things, and quite apart from possible political disturbances, we shall have to go through a genuine crisis, as distinct from a depression; a crisis beginning in the field of finance, when some international obligation cannot be met or some international credit cannot be renewed, spreading to industry and giving us a bad spell of unemployment, comparable with the unemployment of the post-war period a century ago, and more dangerous because of the high standard of living to which the people in this and some other countries is becoming accustomed.

CO-OPERATION.

Bombay Provincial Co-operative Conference.

The Director of Information, Bombay, writes:—Special importance attaches to the Report of the last Bombay Provincial Co-operative Conference, for two reasons. It was the last Conference organized by the Registrar. The Central Institute will take over the management from next year and it was the first Conference that has been held on an elective basis. Again the arrangement of the business at the Conference showed a distinct departure from the practice hitherto followed. Instead of calling for a number

of papers from several delegates, the Registrar this year assigned to seven sub-committees, some problems of practical importance in the movement.

The Report opens with the inaugural address of His Excellency the Governor, in which His Excellency gave a deeply interesting review of the progress of the movement during the last year, and examined the lines of future advance. Then follows the speech of the Registrar, in which he gave a summary of the action taken upon the resolutions of the last conference, and added some illuminating comment upon the situation of the Co-operative Movement. He concluded by expressing the belief shared by all the delegates that by Co-operative Movement at the moment. He concluded by expressing the belief shared by all the delegates that by co-operation in the improvement of economic conditions, by providing easy and reliable credit, by stimulating industry, by securing adequate and sanitary housing, and, in a word, by supplying the fundamental amenities and facilities of modern human life, they were contributing materially to the true progress of the community, and stimulating a steady and significant growth in public morality, prosperity and idealism.

Among the questions discussed by the several sub-committees, the most important were the formation of a Co-operative Board, mainly elected but partly nominated, to work with the Registrar; the introduction of cheques and discounting facilities; the need of a Producers' Bank; the reconstruction of the Consumers' Wholesale Society; the financing of Cotton Sale Societies; the constitution and functions of Co-operative factories, and the Co-operative Sale of Agricultural Produce.

Rules of procedure for the conduct of the business of the Conference were also considered by a Sub-Committee, and adopted at the Conference. It was recommended that a Committee of five persons, representing the Central Banks and the Co-operative Institute, and including the Assistant Registrars, should be appointed to make definite recommendations for the purpose of establishing a service of trained managers. It was resolved at the Conference that Agricultural Credit Societies, and Agricultural non-Credit and Weavers' Societies, in their early stages of development should enjoy free audit. The scale of audit fees for other kinds of Societies was also laid down.

The Report contains a number of very informing and practical notes by some of the most prominent non-official workers in the Co-operative field, and the highest officers in the Co-operative Department. It

also contains a report of the discussion in the Conference on the various recommendations of the Sub-Committees, in which many prominent Co-operators took part. It is thus a very readable and instructive document and should be read, not only by every Co-operator and every student of Indian economics, but by very many other intelligent people who will learn from it something of the great potentialities of progress for this Presidency, which exist in the Co-operative Movement.

CORRESPONDENCE.

To

The Editor,

Mysore Economic Journal, Bangalore.

A Greeting From St. Dunstan's.

Sir,—This is the Season of Greetings and Gifts.

May I send to your readers Greetings and ask them to send to me Gifts?

These Greetings will, I hope, give real pleasure. They convey the gratitude of the soldiers blinded in the War for the sympathy and help which has come to them from all parts of the world. They carry the news that all we hoped for from the training given at St. Dunstan's is being justified by these blinded men in the very wonderful success that they are making of their lives.

I do not think that anyone would say it gets easier to be bravely blind as the years go on. It becomes easier to do things in the dark, but the demand on the will to keep pace with normal life grows greater rather than lessens. Constant effort is extraordinarily exacting, and it is really splendid how the men meet this demand on themselves, keep up their interest in everything and maintain their notable record as workers; some in offices, some practising as masseurs, some as poultry-farmers, and others as expert craftsmen.

There are still more than five hundred men learning to be blind in our class-rooms and workshops.

Besides those actually blinded on the battlefields, 23,000 men were discharged from the Army with seriously damaged sight, and unfortunately, many of these are finding it necessary to come to St. Dunstan's. We are dealing, too, with a number of men whose health does not enable them to make such quick progress as others. At the same time it becomes increasingly difficult to find for the men who are ready to start on their new life suitable

homes; there is the universal shortage of houses and a great scarcity of such small properties as the poultry-farmers need. Thus the difficulty and expense of setting the men has increased while we have to face enormously multiplied costs in providing for those who are our guests, in maintaining our convalescent and holiday homes, and in carrying on the ever-increasingly important work of the After-Care of the blinded soldiers.

We have also now to meet the expense of moving our head-quarters—the offices for the organization required to look after nearly 2,000 men, and also the classrooms and workshops. The House with its beautiful grounds so generously lent by Mr. Otto Kahn as a Hostel is no longer available: fortunately however, we have been able to find for our new quarters another house in Regent's Park—a place which for several generations has been the London Home of the Marquesses of Bute. The interior has been adapted for offices, and in the gardens the the class rooms and workshops have been re-erected. The place is near the Lake on which the blinded soldiers have taken so much pleasure in rowing, and both from the point of view of fresh air and of opportunities for unimpeded exercise the situation is ideal.

This starting again in the creation of a new training centre for the blinded soldiers has, however, been no small matter, and it adds to the reasons already referred to which prompt this appeal for the generous help of your readers.

The blinded soldiers have created a magnificent record; the plans for helping them back to normal life have worked out better, I think, than anyone dreamed would be possible. I think, too, there is no one who realises what the gift of sight means, and what blindness must mean, who would not wish to help on this work which St. Dunstan's has undertaken.

I trust that any of your readers who are so generous as to respond to this appeal will forward their contributions to me at St. Dunstan's Head-quarters, Regent's Park, London, N. W. I.

25th Nov. 1920.

Yours faithfully,

ARTHUR PEARSON,

*Chairman—Blinded Soldiers'
and Sailors' Care Committee.*

BOOKS IN BRIEF.

India in 1919.—A Report prepared for presentation for Parliament. By L. F. Rushbrook Williams, Fellow of All Souls; Officer on Special Duty in the Home Department of the Government of India. Superintendent, Government Printing, India. Price Re. 1.

Mr. Williams has again produced a readable report on the moral and material progress of India. It is a book that we desire every one to read for himself. Each reader may have his own views on Mr. William's account of the past year's record, but it is needless to add that Mr. Williams has given us a book full of information well digested by him. He lays emphasis on particular events and particular persons but that is a matter which each man will judge for himself. The chapter on the economic life of India (Chapter III) is one to which we would invite particular attention. It is both clear and succinct. On controversial topics Mr. Williams is not seen to the best advantage but that again is matter which might well be left to each reader. It is a book eminently to read and not to retail. The book is well printed and handy and is a marvel of cheapness at 1 Re per copy.

Income-tax—How to Avoid Overcharges and Obtain Repayments. By A. D. Macmillan, formerly Surveyor of Taxes. Third Edition, 1920-21. Published by Mr. Effingham Wilson, 54. Threadneedle Street, London. Ec 2—Price 3sh net.

We have pleasure in referring once again to Mr. Cunningham's practical book in these columns. The present edition deals from the standpoint of the 1920 Income-tax. The main Chapters as usual deal with (1) Causes of overcharge, (2) Classification of Incomes for Assessment, (3) Special Allowances from Assessed Income, (4) General allowances prior to 1920-21, (5) The 1920 Income-tax, (6) Connection and Repayment of overcharge, (7) Miscellaneous notes, and (8) Specimen cases of Repayment claims. We do not think that any further elaboration of its contents is necessary to point to the usefulness of this book. We have no doubt that it will be found useful for purposes for which it is intended to hit—how to avoid overpayments. Though our own Income-tax Act differs from the English Act, still the use of this book here by people assessed to Income-tax will enable them to easily avoid unnecessary overcharges and to obtain, without the aid of lawyers and accountants, overpayments made by them.

We have received from Messrs Ganesh & Co., Madras "Songs of the Sea," an excellent book of

poems by C. R. Das and Arabindaghose; some leaflets and pamphlets from the C. L. S. for India, Madras. Messrs. Ganesh & Co., Madras, have also sent us a copy of "Sea-Change," another book of poems by Mr. J. H. Cousins. There is much exquisite poetry in tiny this volume as well. We would specially refer to "A Passer-by" which is full of charm.

The Production and Consumption of Rice.—Imperial Institute Report. Published by Mr. John Murray. 6 sh. net.

In dealing with the problem of food supplies in the United Kingdom during the war, much attention was paid to the question of increasing the supplies of rice from British countries. In this connection the reports on the rice trade of India in relation to the rice resources of the world recently published by Mr. John Murray as the third volume of the reports of the Imperial Institute Indian Trade Enquiry are a mine of valuable information. The Indian Trade Enquiry was conducted by Special Committees appointed by the Committee for India of the Imperial Institute, at the instance of the Secretary of State for India, to investigate the possibility of increasing the trade of the United Kingdom and other parts of the Empire in Indian raw materials. In the present volume the results of the enquiries made by the Special Committee on Food-grains with regard to the Indian rice industry are embodied in a report on the Trade in Indian Rice, to which are appended two further reports on the Production and Uses of Rice and the Utilization of Burmese rice and its by-products, respectively. These latter reports comprise summaries of information prepared at the Imperial Institute for the Committee. In the main report reference is made to the two branches of the world's rice trade viz., the far Eastern branch, requiring a cheap rice for feeding the native population; and the Western branch requiring large quantities of a medium quality rice and smaller quantities of a high quality product. The sources of supply of these markets are referred to, and sections are devoted to the following subjects; the world's trade in rice; the rice trade of India with the British Empire and with the Continent; imports, exports and home consumption of rice in European countries and the United States; the comparative cost of handling, milling and transporting rice in the United Kingdom and on the Continent. The industrial uses of rice are also dealt with and a series of statistical tables form an appendix to the report. In 1913, India (chiefly Burma), Siam and Indo-China together contributed 94 per cent of the world's exported surplus of rice (including paddy i.e. unhusked rice), the amount of the Indian exports

roughly equalling those from Indo-China and Siam combined. The total Indian export (2,450,000 tons) is approximately equivalent to the total requirements of the British Empire from the three chief exporting countries. From the point of view of a self-supporting Empire therefore it would appear possible for India to become the sole source of supply of rice to the Empire. Among the recommendations made by the Committee are suggestions for modifications in the headings of rice exports in the official Indian Trade Returns, with a view to tracing the development of the important rice milling industry of India. Since the report was made, alterations on the lines suggested have been made in the Indian Trade Returns. Certain changes in the headings of the rice exports in the Trade Returns of the United Kingdom are also suggested. The Committee also make recommendations for the regulation of foreign interests on the Indian rice trade, and the reconsideration of port charges and railway rates which at present constitute a severe handicap on the British rice trade in competition with the Continent.

Trade in Indian Oil-Seeds.—*Imperial Institute Report.*—Published by Mr. John Murray—Price 6sh. net.

The Report of the Indian Committee of the Imperial Institute on the trade of India in oil-seeds has been published by Mr. John Murray. The volume emphasises in a striking way the vast importance of the Indian oil-seed industry. The total annual production of oil-seeds of all kinds in India is probably well over 5,000,000 tons in quantity and £50,000,000 in value; in normal times approximately one-third of the output is exported. No other country produces in commercial quantities so great a variety of oil-seeds. Of the ten chief of these, *viz.*, linseed, ground nuts, cotton seed, rape seed, castor seed, sesame seed, copra, mowra seed, poppy seed and niger seed, India supplies no less than 30 per cent of the total amount entering commerce. Before the war about one-third of the total quantity of oil-seeds exported from India came to the United Kingdom, the chief kinds being cotton seed, linseed and castor seed. Certain other oil-seeds, such as ground nuts, sesame, copra and mowra, were shipped mainly to France, Germany, and Belgium. Various suggestions are made by the Committee with a view to extending the trade in Indian oil-seeds with the United Kingdom and developing the British oil-seed crushing industry. It is considered that a free choice of the raw material produced within the Empire should be secured for this industry if necessary by a system of rationing and licensing in the producing country. If further assistance is required an import duty should be imposed on oils and fats of all kinds imported to the United Kingdom from foreign countries.

The Committee consider that the latter method would be more satisfactory than a preferential export duty on Indian oil-seeds. A memorandum on the effect of import tariffs on the oil-seed crushing industry, by Mr. J. W. Pearson, Chairman of the Seed-Crushers' Association of the United Kingdom, is appended to the Report. The volume also contains a detailed account of the Indian trade in oil-seeds, prepared at the Imperial Institute for the Committee.

INDIAN TANSTUFFS.

The Board of Industries and Munitions have issued a monograph on Indian Tanstuffs by Mr. J. A. Pilgrim, M.S.L.T.C., Tannin Expert to the Government of India (Superintendent, Government Printing, India, Calcutta, Six annas). The following prefatory note by the author gives an idea of the scope of the work:—

During the period May to November, 1918, a number of tanstuffs underwent laboratory examination at Maihar, and a good many of these were further tested in the tannery connected with the Government Tannin Research Factory, on a practical scale. The practical tests having been carried out under the Directorship of Mr. W. A. Fraymouth, Director of the Tannin Research Factory, by various members of staff, they were not actually under the control of the present writer, though he had the opportunity of studying the work done in the tannery. In the meantime he was responsible rather for the initial laboratory work, and no account of the investigations undertaken having been as yet published, he has been asked to give a resume—primarily of the work done by himself and his staff. It should, however, be noted that many of the samples examined by the writer during the period under review were done with samples which he had not personally collected, and that no investigator can guarantee absolutely that the results obtained in his analyses accurately represent the true average for the species in question, except where he himself has also been responsible for the taking of the average samples. Many samples examined were received by post or rail, having come very long distances, and though it has, in the past, been his endeavour to make it plain as to how samples of tanning materials ought to be collected in order to give the best results, yet, the writer cannot, without definite knowledge of the fact, feel entirely satisfied that proper methods of selections and collection have in every case a actually been applied. Under the head of many of the tanstuffs referred to in the succeeding pages, particulars of the size of sample have been given over the analysis figures of the tanning material in question.

The results of analyses have all been expressed, calculated to the *absolutely dry* raw tanning material, this being the only satisfactory means of comparing one with another, as also with the analyses of other tanning materials and extracts. The moisture content in air-dry raw tanning materials varies considerably, both according to the nature of the material, and also to the conditions of weather prevailing at the particular time. Ten per cent of moisture is, however, a pretty fair average in many

parts of India. In Central India, the district where the samples referred to in this paper were analysed, in dry weather the moisture often goes down to 5 to 6 per cent air-dry, although during the rains it may be anything from 10 to even 12 per cent. The writer has, speaking generally, in his calculations of yield of extract from air-dry tanning material, taken figures for moisture content somewhat in excess of those found by analysis. He has, however, in almost every individual case, mentioned the amount of moisture he has actually allowed for in the air-dry bark in his calculations of yield. In addition to the yield, in the case of tanstuffs promising from the point of view of extract manufacture, he has also given figures for the calculated, *i.e.*, theoretical maximum possible percentage of tannin. This figure has been based upon the proportion of tannins to soluble non-tannins. It does not take account of those substances soluble in a hot extract liquor, but becoming insoluble on cooling, of which a certain proportion are removed from most raw tanning materials. It therefore represents the ideal where no such difficultly soluble bodies are present, and where there is no production of such during the concentration in the vacuum pan. Speaking generally, the actually percentage of tannin in the finished commercial product is likely to be at least some 5 per cent below the ideal figure.

In the present paper, the yield of extract from any given tanstuff has in almost every instance been expressed in terms of the so-called "crystals". "Crystals" are now a recognized commercial form of tannin extracts. They represent in actual effect, the broken-up scale produced in the film type of of final concentrator, and contain on an average about 5 per cent of moisture.

It should be mentioned that the various tanstuffs have been dealt with, as usual, in their botanical order.

THE EGYPTIAN ADMINISTRATION REPORTS.

The Reports of H. M. High Commissioner on the Finances, Administration and Condition of Egypt and the Soudan for the period 1914-1919 (cmd. 957) issued recently, there is a reference to the proposed State University to be established in Egypt under the heading "Education," a sectional Report says:—Educational developments have now reached a stage which makes it possible, and very desirable, to consider as a practical question the establishment of a State University. . . . The existing colleges furnish no opportunity for students, after completing their secondary course to secure a liberal education apart from a professional career; the complete separation of the courses makes the present organization of higher education inelastic, leaving little opportunity for optional studies or for different combinations of courses, and insufficient provision and incentive exist for post-graduate studies or original research. In short, the present organization insufficiently sets forth high ideals, has developed no academic traditions, and is too exclusively utilitarian. It tends to foster the belief that the obtaining of a diploma is the one and only purpose to be kept in view, and fails to evoke the true spirit of culture—the pursuit

of learning for its own sake. . . . While there is need for the expansion of the existing professional colleges, an effort should be made at the same time to meet the requirements of those . . . who wish to pursue a higher course of study for the sake of general culture, without reference to any particular profession or career. Further, the long and varied history of Egypt, as well as its geographical situation and its position in the Moslem world, clearly point to the appropriateness of Cairo as a seat for a college of Oriental studies. At present Egypt, in spite of incomparable advantages, provides no opportunities (such as exist in the most important European universities) for acquiring a literary knowledge of the languages that are cognate with Arabic and of the comparative philology of the Semitic languages of Ancient Egypt, or for the investigation of the many literary, archaeological, historical, and philosophical questions on which these studies throw light. The time has come for the creation of higher courses of study of the true university type. . . . A commission was appointed by Sir Adly Yeghen Pasha in 1917 to consider this question. In 1918 it presented a preliminary report, but no effective steps were taken thereupon. The question is now being pressed forward with a view to early effect being given to the proposals.

ACKNOWLEDGMENTS.

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